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THE BRITISH NAVAL OPERATIONS IN THE WEST INDIES, 1650-1700[1]

A STUDY IN NAVAL ADMINISTRATION

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The operations of the British Navy in West Indian waters during the latter half of the seventeenth century are not an unknown page of Colonial history. The fleet engagements, expeditions, and single-ship actions, all have been described time and again; but they have, for the most part, been treated only as a series of isolated and independent facts, with no relation to each other or to the more important events of the period. Rarely have historians sought to discover the underlying causes for the outcome of the events which they recounted and for which they distributed praise and blame among the commanders. Yet these very causes often spelled disaster long before an enemy was sighted, and mismanagement in the administration at home, lack of preparation, inferiority of personnel, and mediocrity of material, all, at some time, proved obstacles which the abilities of even the best captains were powerless to overcome.

From the point of view of the naval student, the chief interest of the operations of this period lies in the light which they throw

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upon the administrative history of the Royal Navy. The expeditions sent to the West Indies were curious affairs, and notable examples of the manner in which the navy was run. Their history is a repetition, truly amazing, of a series of gross miscarriages, in which those in authority at home betrayed incredible ignorance of the condition of affairs in the plantations. Effort after effort was made to drive the French and Spanish from American waters. Expeditions by the score were sent out in the hope of effecting some important conquest, but the vessels were never despatched except in driblets, too few to produce the slightest impression, too late for the purposes for which they were destined, and the result was nothing short of a series of reverses that make one wonder how the British ever had the courage to try again (1).

In order to understand the underlying causes of these repeated failures, it may be well perhaps to consider the manner in which the service was at this time governed. Then only can we realize how the things came to be as they were.

During the period of the Commonwealth and Protectorate the entire administration of the navy was assumed by Parliament through an Admiralty Council of State, assisted by a board called the Committee of the Navy and Customs, whose functions were chiefly financial, and another body known as the Commissioners of the Navy, upon whom fell the brunt of administrative responsibility (2). With the Restoration, however, these commissions were dissolved. The old system of the monarchy, instituted by Henry VIII, in 1546, was revived under the control of the Duke of York, as Lord High Admiral, and the management of the navy was once more vested in a board of civil officers, known as the Four Principal Officers, and later as the Navy Board (3), who acted as the Lord High Admiral's Council of Advice insofar as matters of government were concerned. Theoretically they existed only to carry out his instructions, but in practice they really enjoyed great administrative powers (4). Their duties were outlined at length in the Duke's orders. In their corporate capacity as the Navy Board, their business was to contract for the necessary stores and materials for the service, to superintend the supply of victuals, to pay the seamen and workmen, and to recommend persons for vacancies in the inferior offices. In addition to these functions, which they discharged at their weekly meetings

at the Navy Office in Seething Lane and Crutched Friars, the Principal Officers were called upon to perform certain departmental duties. The treasurer, as his title shows, was held responsible for the financial management of the navy; he drew up the estimates, obtained the necessary funds from the Lord High Treasurer of England, and made a yearly report to the Lord High Admiral on the state of the departments. The surveyor prepared the estimates of the stores required by the navy, reported on the condition of the dockyards and of the King's ships in service and the repairs needed by them; he was also required to see that the prices paid for supplies were reasonable, and to make an annual survey of all the ships of the navy. The comptroller was supposed to act as a check upon both the treasurer and the surveyor; he superintended all the payments made by the board, kept a record of all moneys advanced, of all estimates, and of privy seals, reported annually to the Lord High Admiral, and watched his brother officers. The clerk of the navy, or clerk of the acts, answered to the permanent under secretary of the present time. He was the head of the office work, attended the meetings of the board, kept minutes of its transactions, and saw to it that the "plurality of persons was proposed for the supply of all wants." But his range of interest did not end here. No matter appears to have been too minute or insignificant to escape his attention, and the records show that everything from shipbuilding and the preservation of timber for the navy to the actual discipline and management of the service was personally looked into by him (5).

Elaborate provisions are found in the Duke's orders for preventing fraud, and every care was taken to check the sins of one man by the vigilance of another. The task of reform, however, was not an easy one (6). Corruption was then an evil of long standing. Even had the code of honor been higher, it is doubtful whether it would have been possible to check the waste and mismanagement. A proper supervision may have been possible in 1638, when the Earl of Northumberland issued his instructions for coping with a similar problem, but since that time the navy had so grown that it was beyond the power of the Four Principal Officers personally to superintend every detail of their office. Much that was expected of them personally had to be left to subordinates, who in turn could do nothing without orders from their

superiors (7). Consequently when it came to the fixing of responsibility a serious difficulty arose. No one was really answerable. Divided control meant divided responsibility, and that in turn meant no responsibility, or, at least, one very hard to fix.

Beneath these four great officers were a number of lesser officials who were not members of the board, such as the storekeeper, the clerk of the cheque, the clerk of the ropeyard, and the clerk of the survey. But as business increased and the work grew more complex other officers and boards sprang up, who took up the duties thrown off from the principal offices. In the course of a century, altogether 13 departments came into existence, no two of which were under the same roof. At this period the Navy Office was in Seething Lane and Crutched Friars; the Navy Pay Office, in Old Broad Street; the Victualling Office, at the end of East Smithfield; the Board for Sick and Wounded, on Tower Hill; the Treasurer's Office, in Leadenhall Street; the Board of Transport, near Seething Lane; the Prize Office, in York Buildings; the Chest, in Chatham; and Greenwich Hospital, at Greenwich (8).

A further cause for confusion is found in the fact that even all these parts of the administrative machinery did not suffice for equipping and managing the navy. Other branches of the government also were depended upon and they likewise were scattered over every part of London. The Board of Ordnance was in the Tower; the War Office, at Whitehall; the Commissioners of Customs, on Thames Street; the Lord High Treasurer, in the palace at Whitehall; the Post Office, in Bishopsgate, Brydges Street, or Lombard Street; the Board of Trade and Plantations, in the Cockpit; and Apothecaries Hall, on the east side of Blackfriars.

The government of the navy by the Four Principal Officers acting under the Lord High Admiral continued until July, 1673, when the authority of the Duke of York was overthrown by the passage of the Test Act. The administration now underwent a great change. The office of the Lord High Admiral still continued to exist, but its powers were restricted. The King practically reserved for himself the control of affairs, the disposal of offices and places, and the collection of the Admiralty dues (9). At the same time, July 9, Lords Commissioners were appointed under the great seal to execute the office of the Lord High Admiral of

England, left vacant by the resignation of the Duke of York (10). Their meetings began on the 19th of July, 1673, and were held three times a week, later twice a week, at the Council Chamber, the business of the navy abundantly calling for it (11). From its inception this new body showed considerable administrative ability and did its work energetically and effectively, though greatly handicapped by the usual lack of funds.

There were now, then, two boards—the Admiralty Board and the Navy Board—the one executive and military, the other civil and administrative; the one nominally superior, the other, with the prestige of age and political power, practically independent. The result was divided control, and consequent antagonism between the two.[2]

One happy appointment in this year of upheavals, however, was that of Samuel Pepys to the newly created and influential position of Secretary to the King and the Commission "in the affairs of the Admiralty of England." The choice was inevitable, for Pepys was the one person in the country best acquainted with the workings of the management of the navy, having been, since 1660, clerk of the acts (12).

Thus the administration continued for the next seven years. The King, with assistance of the Duke of York, who, though excluded from office by the Test Act, still enjoyed a sort of formal control, endeavored to exercise his prerogative, in the hope that some day his brother might be restored to power as Lord High Admiral. But that was not to be. The discovery of the Popish plot worked the country into such paroxysms of madness that the Duke was obliged to flee to the Netherlands. Pepys also lost his post on a charge of being a convert. Even the commissioners were dismissed. No one was now left at Whitehall at all ac-

[2] An instance is to be found in the case of the agent appointed by the Lords of the Admiralty in the West Indies to furnish provisions and supplies to the ships-of-war of the Royal Navy, whom the Commissioners of the Navy suddenly deprived of his authority, with the result that no one was left to supply the wants of the men-of-war. The merchants would not furnish the money, lest on contradictory orders the bills would not be paid. Governor Beeston finally wrote to the Board of Trade, complaining that H. B. M. S. *Hampshire* had been in port nearly two years, but that neither men nor stores nor provisions had been sent out for her and that she was in consequence nearly spoiled. (Cal. Sta. Pap. (A. & W. I.), 1696-7, No. 101.)

quainted with administering the service. The office of Lord High Admiral and the Navy Office were both suspended. The result of these wholesale changes was an organization such as had ruled the navy for Charles I, after the death of the Duke of Buckingham, in 1628—a commission vested with all the powers heretofore granted to two separate boards. But the appointments were most injudicious. None of the members chosen had had any previous experience to fit them for the gigantic task that lay before them. All were "wholly ignorant" of naval affairs. Under their control the service was all but destroyed. The effective force was reduced, probably on account of lack of funds, and what ships were kept in service were allowed to decay owing to neglect and waste (13). In five years the number in commission fell from 76 large ships to 24 small ones, and the latter all "in harbor and so far out of repair" as to require the sum of no less than £120,000 to fit them for service (14)!

Fortunately this state of affairs did not continue for too long a period. The commission of 1679 was revoked by patent dated 19 May, 1684, and the office of the Lord High Admiral resumed by the King, just before his death, with the advice of "his royal brother, the Duke of York" (15). About the same time the "office of secretary for the affairs of the Admiralty of England" was formally established by letters patent under the great seal, and Pepys, who had been living in retirement, was appointed to this influential position. But Charles II died before anything could be done to better the condition of the navy. The fleet was indeed in a deplorable condition. The debt amounted to £384,000; old ships were decayed and unfit for service, and new ones still uncompleted, though the money for their construction had already been supplied; and stores and supplies of every description were wanting at the dockyards (16). Strong measures were imperative, otherwise the fate of the navy was sealed. The King bestirred himself, and, though he did none of the work himself, appointed to office the men best able to restore order out of anarchy. A special Board of Commissioners in quality of principal officers of the navy were appointed in April, 1686, with all the powers vested in former commissions (17). This marked a return to the system of 1673. During their incumbency the new officers brought the navy into a high state of efficiency, but they could not succeed in correcting all the evils brought about by so many years of mismanagement (18).

In addition to the evils and defects already noted, several other causes contributed to the failures of these successive administrative reforms. Foremost among these were the financial difficulties in which the government repeatedly found itself. Under the Commonwealth a liberal policy was indulged in for a time, but within four years, 1649 to 1654, such demands had been made upon the Treasury that the service was badly crippled (19). The restored monarchy consequently found itself burdened with the indebtedness of the interregnum, which, in November, 1659, was estimated at £722,000. As early as July, 1660, Pepys noted that the navy was in a very sad condition for want of funds, and this condition instead of improving became more and more serious as time went on. So enormous were the arrears, that in March, 1665-1666, over £2,500,000 were needed to pay the victuallers and provide supplies for the current year, whereas the available funds for this purpose amounted to but half that sum! Indeed at one time Pepys doubted whether even five ships could have been sent out without great difficulty. It is not surprising then that the people were reluctant to trust the government and refused to furnish supplies for the navy in spite of the good payments promised (20).

" Personal and particular failings " are also mentioned by Pepys among his reasons for the failure of the administration to accomplish more. The Navy Board in its corporate capacity failed lamentably in the discharge of its duties; the treasurer was charged with a general remissness in executing his office; the comptroller had neglected to keep his accounts and to " comptroll " properly the treasurer and the victualler; while the surveyor had not only failed to present the reports required of him, but had besides actually committed the most important functions of his office to " under-officers " (21).

Among the officers afloat, also, neglect and inattention to their duties were noticeable. A serious feud between the tarpaulins, the genuine seamen, and court gentlemen distracted the service. As Macaulay aptly stated the question: " There were seamen and there were gentlemen in the navy of Charles II, but the seamen were not gentlemen and the gentlemen were not seamen." Neither got along with the other, nor could they apparently succeed without each other. Sir Anthony Deane lamented that he could not help feeling contempt for the " gentlemen commanders who must

have all their effeminate accommodations for pomp; and that it all would be the ruin of our fleets if such persons were continued in command, they having neither experience nor being capable of learning, because they would not submit to the fatigue and inconvenience which those who bred seamen would undergo." "Bethink yourself," he wrote, "what sort of sea captains the honor and safety of the crown and government will have to rely upon for support at sea, when the few commanders (for God knows they are but few) that are now surviving of the true breed shall be worn out" (22).

The Revolution of 1688 brought no considerable changes in the mere administration of the navy. Its influence was in another direction, and in this it affected the sea service as deeply as it did the rest of the nation. Parliament was now the dominating body. Court favor and the influence of favorites no longer secured the best commands. It was through Parliament that promotions were now earned, and, what was still more important, by Parliament that pay was supplied. Improvement resulted from this change. The sea service became sharply distinguished from the army. Previously men not infrequently served on both land and sea. But the army now drew to it the gentlemen volunteers who formerly had been in the fleets of Charles II, and the navy was left to the sole care of the tarpaulins who had been bred to the sea and were willing to endure its hardships. The purely technical part, the handling of the ships, was now done better than before, but the good seamen were not necessarily good fighting men, and the change involved a fall in the purely military spirit that, without a doubt, was a great misfortune (23).

Such was then the administration to which the country looked for the management of its fleets and squadrons. It was a form of government that developed with the growth of the navy itself, an administration devised to meet the exigencies of the times. Historically, its institution and development were essentially a civil process, the purpose of which was to provide a national sea force for war. But that very civil branch, the Navy Board, in the course of years became so powerful through its political associations as to get out of harmony with the Admiralty, which was charged with the responsibility of waging successful war with the means furnished by the lesser board. Opposition between the civil and military branches consequently was born with the very in-

ception of the Royal Navy's Administration, and it was only when the Navy Board was abolished in 1830, when its duties were distributed among the members of the Board of Admiralty, that the organization became logical and effective. Until then matters went on much as before, and the same errors were committed time and again. It is interesting to see how the system worked out in practice.

The condition of the island possessions in the West Indies and in the Caribbean, which England was striving to retain at this period, was far from enviable. Surrounded by French and Spanish settlements, they were continually embroiled in the current European wars, and a prey to the hordes of buccaneers and pirates that infested the Antilles. Never were they secure from attack; never were their merchant fleets certain of reaching their destinations unless convoyed by men-of-war; dependent upon the mother country and their New England neighbors for their very subsistence, they lived in continual dread lest this supply should be interrupted (24). How greatly in need of protection then were they, and how modest their demands upon the government at home! A frigate or two, or a fireship, was usually all they asked; and surely no more than they received (25). The question naturally arises why so few vessels were allowed them in their dire need, for a dire need it really was. Could the vessels not be spared from home waters, or was it neglect and indifference on the part of the authorities in London? True, the events in the West Indies were only of very minor importance compared to the operations which the British fleets were carrying on in the English Channel—the two conflicts with Holland and the wars of the League of Augsburg and of the Spanish Succession—which compelled the King to center his forces about his own shores. But the repeated efforts made to secure the command of the sea in the West Indies at this period were far too numerous for us to believe that great importance was not attached to the results it was hoped these expeditions would bring about.

It cannot be denied that the officials at home, enjoying the ease of their lucrative political posts, were directly responsible for the disasters that followed one another so rapidly. They could not understand the true state of affairs as they existed in the plantations; they would not. The story that follows reveals the scene beyond question. But, then, there was also another answer to the

question; an answer that had to be sought elsewhere—in the plantations themselves—for the difficulties which the governors and their subjects experienced in obtaining aid from England were as nothing compared to the hopeless task of trying to keep in service the few ships with which they had, perchance, been supplied. For there was not a place in the islands where these ships might refit or repair damages (26); no men available to refill their depleted crews; no guns to arm them; no way of obtaining supplies and provisions even for short cruises, as the planters seldom would spare any or else refused to sell their products in exchange for valueless pursers' bills (27). And lastly, there was the serious question of the tropical climate which played so important a rôle, as ships never could stay in those waters more than a season without losing so many of their men that barely enough would be left to navigate them back to England (28).

One of the first services for which the navy was employed by the Council of State after the close of the Civil War was to stamp out what royalist sentiment still existed in England's outlying possessions in the West Indies. The despatch of a fleet to Barbados was therefore considered early in December of the year 1650, and the Committee of Barbados received instructions to prepare for this purpose. Sir George Ayscue was the Council of State's choice for the command of this squadron, and the Committee of the Navy were directed to pay him the necessary sums to defray the contingencies of a fleet. By the last week of January, 1651, the Committee of the Navy was able to report on the strength of "The Barbados Fleet" which should be sent out, and the Council of State instructed them to attend to this matter at once. But delays occurred which put to stop to all expeditions. Ayscue never received his instructions till the middle of February; two months later the question of victualling the fleet was yet unsettled; and the Council of State still considering the "business concerning the fleet." The vessels were now at Plymouth, where they had been ordered to await further instructions previous to sailing, when suddenly came orders for part of them to repair to the Scilly Islands. Everything had now to be done over again. The Council of State proceeded immediately to give instructions for the fitting out of new ships. Four were ordered victualled for nine months, the Committee of the Navy were required to see that the wishes of Parliament were faithfully carried out, and

Sir George Ayscue was directed to proceed on his voyage as soon as possible. This was on the 20th of June. Within the next week, however, reports came to the Council of State which caused an investigation into the seaworthiness of the vessels chosen for this service, which finally influenced the Council again to change its orders and recall the vessels employed off the Scilly Islands in order that they might be fitted out as originally intended. Two weeks more were spent in preparations; then came the long awaited supplies of ordnance, and finally on the 5th of August, 1651, the expedition sailed. The coasts of Portugal and Spain were first visited in a vain search for Prince Rupert's squadron, after which the vessels headed for Barbados. Calms and light winds, however, greatly delayed the passage, so that it was not until the middle of October that they made their appearance in those waters. The island was not the least prepared for a long resistance. Nevertheless, Governor Willoughby resolved to hold out as long as possible, and in this decision he was ably supported by the planters, until the effective blockade established by Ayscue convinced them of the hopelessness of further resistance and the island capitulated (29).

Over two years elapsed before another force was despatched to American waters. Lawless violence had reached such a stage that the government no longer could allow the urgent appeals from the English settlements to remain unheeded. A large force was therefore organized during the summer and fall of 1654 to bring relief to the oppressed planters (30), and operate against the Spanish, French and Dutch, in retaliation for their aggressions on English trade. Thirty-eight ships-of-war, carrying 1134 guns, 4380 seamen, and 3000 troops, were proposed for this service under the joint leadership of Admiral William Penn and General Robert Venables. This selection of leaders, however, proved unfortunate from the very start. Troubles arose almost immediately; the two commanders could not agree; they quarreled even before the expedition sailed; and, to make the situation still worse, they found themselves continually opposed by a committee which Cromwell, following the practice of Parliament, had also placed in charge of the expedition. But this was not all that boded ill for success. None of the troops were seasoned, their numbers far below the stated figures, and besides the victualling had been very badly done—possibly because of the poverty of the administra-

tion—what few stores obtained were found to be defective, and the greater part could not be prepared in time and had to follow the ships at a later date.

Toward the close of December, 1654, Rear Admiral Dakins was finally despatched in advance with 14 ships. The main squadron followed five days later, but many of the vessels were such dull sailers that Penn and Venables left them behind and pressed on with the rest to Carlisle Bay, in Barbados, which had been designated as the rendezvous. There the whole armament assembled on the last day of January, 1655. When the expedition was planned its leaders had hoped for active co-operation from the planters of the islands. But in this they were destined to be disappointed. However anxious the islanders may have been for the government to protect them, they were exceedingly loath to take any measures for their own defence or to aid the expedition in any way, so that it was only with the greatest difficulty, that a single regiment was raised from among them.

Two months were spent at Barbados when the time might have been more profitably devoted to attacking the Spaniards before they had had the opportunity of strengthening their defence. On the last day of March the expedition at last got under way, and, after two weeks cruising, arrived off the island of San Domingo. The troops were immediately landed for an advance upon the town. But they were badly led, ill-armed, undisciplined, without supplies and water, and suffered every hardship in the tropical climate. The attack was a hopeless failure, an uncontrollable panic seized the whole army, and the rout became complete. The officers were thoroughly cowed by this disaster, and the men in no mood to attempt anything more. But something had to be done to escape reproach of failure. Fortunately the thinly populated and defenceless island of Jamaica, belonging then to the Spaniards, furnished the leaders with the desired prize, and thither they at once took themselves (31).

The failure of this expedition left the English settlements in a pitiable state and at the mercy of enemies whom they now, more than ever before, had reason to fear. Appeals for help became more and more frequent. By 1666 St. Christopher had fallen, and the Governor of Barbados wrote that, unless the enemy's advance was stopped immediately, all the islands would be lost (32). Yet the administration at home was slow to appreciate the gravity of

the situation; an occasional vessel-of-war was sent out, but that was all,[a] so that the settlers soon realized that it was futile to depend upon the King's ships. Consequently they set about taking measures in self-defence. The danger of attack forced upon the English governors the policy of encouraging buccaneers. Letters of marque were conferred upon all who would wage war against the Spaniards, and there is little doubt that these new allies did much to save the islands for the English (33).

The outbreak of hostilities with Holland and the alliance of the French King with the Dutch in 1666 introduced a new element into the war in the Antilles. Heretofore all had worked pretty harmoniously against the common enemy, the Spaniards; now the situation was changed, and the English were obliged to face also their former allies. A French fleet soon appeared among the West India Islands, Montserrat and Antigua were compelled to surrender, and St. Christopher was taken possession of almost as easily (34). The news of these successes of the enemy stirred the government of London to make an effort at least to relieve the plantations. Ten ships, mostly merchant vessels pressed into service and fitted for war purposes, were immediately ordered to sail under Captain Sir John Berry. They were expected to inflict great damage on the enemy, but the French were found to be already in such force that all the English could do was to keep them at bay until reenforcements should arrive. These came in the following month, in June, 1667, under Sir John Harman (35), who at once proceeded to inaugurate an energetic offensive campaign. The French commander, M. de la Barre, however, did not wait for him. The news that the two English forces had effected a junction apparently was all that was needed to overawe the enemy; they left to the English the command of the sea, and sought refuge under the guns of their forts at Martinique. Harman had hoped first to retake St. Christopher, but as he had no troops to co-operate with him, he was obliged to confine his operations to the sea. He therefore proceeded in search of the French admiral and found him anchored in the road of St. Pierre under the guns of his shore batteries. Undaunted by the strength of this position, Harman began a series of attacks which lasted

[a] In the years 1661 and 1662 only four king's ships cruised in the West Indies, and then for short periods only. See Cal. Sta. Pap. (A. & W. I.), 1661-68.

from June 29 until July 6. After these unsuccessful attempts, the English fleet finally forced the passage (36). A fireship was ranged alongside the French flagship, and she and three other vessels were reduced to ashes. The conflagration threatened to spread to the rest of the fleet. A panic seized their crews. All seemed lost. But at that moment the wind shifted. The French once more took heart, and by heroic efforts saved the day. The English, discouraged by this unexpected resistance, retired and thereby lost a complete victory. Had they pressed home the attack nothing could have checked them. As it was, a great disaster had been inflicted upon the French. It was not the overwhelming victory claimed by the English reports. But the control of the sea did thereafter pass to them and commerce became impossible for their rivals. The peace of Breda, signed on July 31, 1667, brought hostilities to a close and restored the status ante bellum as far as the islands were concerned. Harman, however, remained in the West Indies six months longer to give the necessary protection to the homeward-bound trade, and then, having accomplished all that had been expected of him, returned to England with a great convoy.

When hostilities broke out again in 1688 the home government's attention was once more attracted to its possessions in the West Indies through its desire of reducing the more important islands belonging to its enemies. Orders were therefore despatched to the officers commanding in those waters to harass the French as much as possible until reenforcements could be sent out. This proposal received the approval of the King, April 26, 1689, and the Lords of Trade and Plantations at once proceeded to fit out the necessary force. They first consulted with the Commissioners of the Admiralty (May 2), who submitted a list of ships that might be hired for the service and which might be ready in three weeks. Two weeks later came another account of ships to be sent out, this time from the Navy Commissioners. In the meantime, through the co-operation of the War Office and the Board of Ordnance, a regiment of infantry had been raised[4] and equipped to accompany the expedition. The Lords of Trade, however, had not yet heard from the Admiralty where the troops should embark or how many the ships would hold. So a further delay occurred until

[4] For a description of the novel manner in which this was done, cf. Fortescue, *The British Army*, 1783-1802 (Macmillan, 1905), page 5.

this information could be obtained. In due time it came, but in a manner as astounding as it was unexpected. The Admiralty, with characteristic independence, had discharged practically all the ships hired for the expedition, having decided to use in their place vessels of the Royal Navy; but as these were still at sea with the fleet, they really could not say when the West India squadron would be ready to sail. Some days later, however, they condescendingly sent a new list of ships which they promised would be ready in two weeks. A voluminous correspondence then arose over the fitting out of the squadron and the instructions for its commander. Although nearly four months had already been spent in preparations, the Admiralty had never been informed of the fleet's destination or of the amount of stores and provisions it was to carry to the islands. They raged and stormed; but to no avail. The Lords of Trade knew as little as they did of the King's intentions, so could only reply that the orders were to send out several months' provisions with the troops and that several governors for the West India Islands were to take passage on the ships. The governors, however, had not yet been appointed. Then arose a protracted discussion over the instructions that were to be issued to the commander of the squadron. They were first considered in the month of October, approved a few days later, then reconsidered, amended, further modified, and finally drafted early in December. But the troubles were not yet at an end. The victualling office in despair wrote that it could not obtain provisions, as it had not the money to pay for them, and the contractors refused to deliver anything "without ready money." So the Treasury had to be called upon to produce the desired funds; but as it usually had none to produce, the question arises how the supplies were ever obtained. Next the Admiralty took offence because orders had been issued over its head to the commander of the squadron relative to the embarkation of the troops. More correspondence followed, more complications, until finally the expedition at last got to sea, March 8, 1690, after ten months of "preparation" (37). The squadron consisted of nine ships and two smaller vessels, under the command of Captain Lawrence Wright, an officer of 25 years' service, who had been in the West Indies before. Sailing from Plymouth, the vessels shaped their course toward the Leeward Islands, where a junction was to be effected with Governor Codrington's forces. But stormy weather

so delayed and scattered the convoy that it was not until the last of May that they were all collected at Antigua, and then in so battered a state and with crews so sickly that a further delay was unavoidable. The governor was called upon to furnish troops to accompany the vessels on their coming cruise, but he had nothing wherewith to equip or arm them. The stores sent out with the squadron were so bad as to be utterly useless; the muskets "are of no use," wrote Codrington in despair, and "as to the firelocks, the locks are very bad, the steel being so very soft that they are as likely to miss fire as not. Both matchlocks and firelocks are extraordinarily heavy, which is a great inconvenience in these hot countries." And to add to his troubles no good pistol powder had been sent out. "It is a great misfortune to us," added the governor, "that the officers entrusted with these matters have not been more careful." The regiments sent as reenforcements were almost in as deplorable condition; one whose strength had been mentioned as 930 men, was found to little exceed 500, while the wants of the men had been so "extremely neglected" that, as Governor Kendall wrote to the Earl of Shrewsbury, "we clothed the whole regiment which was naked before." The season was now far advanced, so much so that operations had to be begun immediately. Codrington added some soldiers to Wright's forces, and together the two began a series of depredatory expeditions. St. Christopher and St. Eustatius were first attacked. Men were landed, works captured, plantations plundered and houses burnt. But to hold the islands was out of the question; the English force was far too small even to think of it. The coming of the hurricane season in July and sickness among the men now compelled the commanders to discontinue their operations until the month of October. Then Wright again put to sea (38), but with his complements so diminished by the fever that he was compelled to press men from merchant ships at Barbados. Plans had been made for an attack upon Guadeloupe. Misunderstandings, however, and Wright's refusal to obey his orders and backwardness in seeking the enemy delayed the expedition until the close of March. Then the attempt was made, a landing was effected, and all was progressing well, when suddenly came the news of the arrival of a French fleet of 12 sail. This intelligence, following closely upon a bitter quarrel between the two commanders, was all that was needed to bring the expedition to a speedy end. Wright,

broken in health, sailed for home; some of his ships followed him with a convoy; the others remained to protect the islands from the enemy (39).

When Captain Wright returned to England, a new expedition under Captain Ralph Wrenn was immediately ordered to the West Indies to take his place. But it did not leave Plymouth until the close of December, 1691. Then, again, the force despatched was lamentably inadequate. We have already seen that the French had sent out 12 vessels. Yet Wrenn's force consisted of but five men-of-war, with troops, and a convoy of transports and victuallers. Perhaps the Admiralty had counted upon the vessels which Wright had left behind; but some of these had in the meantime fallen a prey to the French fleet, so that when Wrenn began operations in January, 1692, he found himself in possession of only seven vessels-of-war, and the enemy stronger than he had even supposed. In fact it was not long before he fell in with their entire fleet of 18 sail. In spite of the odds he fought his way clear and reached Barbados without the loss of a single ship. But he got no further. Sickness here overcame him and the greater part of his men, and such as survived reached England only after great hardships (40).

The failure of this second effort brought the officials to the realization of the fact that the conquest of the French in American waters was not such an easy matter and that, if they were to succeed at all, expeditions of sufficient force must be sent out. Great preparations were therefore begun. An armada was now to be sent out that would destroy the French factories in New France, Canada and Quebec, dispossess the enemy of the Newfoundland fisheries, and overwhelm their forces in the West Indies. The fleet was to be commanded by Captain Meese and to sail by the first of August, 1692 (41). The governors of Massachusetts and New York were notified to expect it in May or June of the year following and to collect troops to co-operate with the vessels immediately upon their arrival (42). But delays of one kind or another postponed the sailing, first, until the end of August, and then, till January, 1693 (43). Sir Francis Wheeler was now in command. The squadron (18 ships) finally reached Barbados in March—just three months too late. Even here more delays occurred. No preparations had been made by the officers in the Indies for any such operations as were intended

by Wheeler's instructions. Before sufficient forces could be collected the month of March was over. Martinique was made the first objective. All the troops available and 1500 seamen were landed on the island. They ravaged the whole coast; then wondered what to do next. Their force was too weak to think of making an attempt on the French works. Still a council of war decided to attempt St. Pierre. The enemy were driven into their works but no further. Sickness broke out among the English forces. Eight hundred men went down with wounds or sickness in three days. Further operations under such conditions would have been sheer madness. A hasty retreat was therefore begun and St. Christopher sought as the least unhealthy spot for the men, but before the month of May was half over Wheeler had lost half his men and most of his officers (44).

Codrington, the captain general of the Leeward Islands, next proposed an attack upon Guadeloupe, but Wheeler's orders were to leave the Indies by the end of May at the latest and proceed to Boston. Even here his vessels were followed by disease and death, and his men were refused permission to land lest they should bring their infections on shore. But the most stunning blow to Wheeler was the intelligence that the governor had had no intimation of his coming till the fleet arrived and that no troops were ready for an attack upon Canada. The letter from England (written on February 2, 1693) conveying the government's instructions to the colonial governor on this subject had been sent by way of Virginia, and never reached him until July 24! In despair, Wheeler finally went to Newfoundland alone. But here also the French were in too strong force to be attacked in a casual way, and he was obliged to return to England, where his ships arrived in October, but in so reduced a state that there were scarcely men enough to navigate them. Such was the end of the expedition from which so much had been expected (45).

Over a year elapsed before another effort was made to dispute the command of the sea with France. Like its predecessors it was doomed to failure. The situation in the West India Islands was indeed desperate. Jamaica, nearly ruined by earthquake and pestilence, was unable to oppose even the privateers that hovered on her coasts and threatened her communications with the continent. Daily the situation became more menacing. Governor Beeston implored aid; his forces were so depleted that he was

practically at the mercy of the enemy and every moment dreading their approach (46). On June 17, 1694, the blow fell. Twenty ships and 3000 men under Monsieur Ducasse came from Hispaniola. Fortunately the governor had had warning of their coming some weeks before, thanks to the heroism of a merchant-skipper, then a prisoner at Petit Guavos, who made his escape in a small canoe over 300 miles of open sea to give the alarm in Jamaica. Beeston prepared for a gallant resistance, and wrote urgent messages to England, saying that without speedy succor, he should not be able to hold out long (47). The Committee on Plantations at once replied, August 3, 1694, that a force would soon sail to his relief, and proceeded to carry out these intentions (48). But the departmental administration in London was not so easily moved to haste. Both the Commissioners of the Navy and of the Admiralty were of the opinion that they had all they could attend to without sending expeditions to the West Indies. The Committee on Plantations then turned to the Commissioners of Transportation, but received little encouragement from their reports. Meanwhile it had been decided to raise two regiments, each of 600 men, which involved complicated estimates of expenses. Then followed a long correspondence with the Victualling Board as to feeding these men. This correspondence, naturally voluminous, became much more so because the Privy Council had named the force to be sent at 1600 men, whereas the Commissioners on Plantations had placed it at 1700, and the Commissioners of Transportation had been ordered to provide ships for 2000 men, and later for 1700. Then came the arrangements for appointment of a Commissary by the Treasury, to take charge of the military chest and for the supply of medical stores by Apothecaries' Hall. And lastly came the selection of the military commander who complicated matters still more by his demands. Preparations were well under way and everything was apparently progressing satisfactorily when difficulties arose in rapid succession. First, all previous calculations were upset by a sudden increase of the number of troops to be sent out; then their commander complained that not enough money, clothing or provisions had been furnished; then the Victualling Board raged because the unexpected call for provisions came just as Admiral Russell's fleet was returning to port to revictual. A torrent of estimates and a volume of correspondence followed in the next two weeks.

By this time the month of November was almost past. The expedition to have arrived in time should have sailed by the end of October. But moneys were not forthcoming from the Treasury, quite possibly because it had none to produce; and the masters of the transports refused to obey their orders. Then the Commissioners of Transportation discovered to their dismay that only 1400 troops were going out, whereas they had provided passage for 1800, and they dreaded the unnecessary expense; and to bring the comedy, or tragedy—for indeed it was a tragedy—to a close, the Admiralty neglected to provide any convoy at all. On January 23, 1695, however, the expedition finally got to sea, and the "speedy succor" so unhesitatingly promised by the Commissioners of Plantations was on its way to Jamaica three months behind time (49).

Before the vessels sailed, the King, who was greatly concerned at the failure of the three previous expeditions, summoned to his presence both Captain Wilmot and Colonel Lillingston, the naval and military commanders, and personally entreated them to co-operate in harmony during the coming operations. This they promised to do; but before they had been at sea a week furious disputes and bitter jealousy over the question of prize money, which the King had ordered should be shared by both services, presaged ill for the results of their joint efforts. In fact Wilmot became so furious that he tried to be rid of Lillingston by inveigling him ashore at Madeira. Failing in this, he next bribed the Treasury's commissary to wreck the military operations, so that the fleet, and he in particular, should have all the booty.

The English commanders were instructed to co-operate with the Spanish in attacking the French settlements in the islands, so immediately upon their arrival in those waters Wilmot and Lillingston visited the Spanish governor at St. Domingo to arrange upon a plan of operations. St. Christopher was chosen as the first objective, and troops at once despatched there. Wilmot, however, delayed the departure of his vessels for several days for no reason whatever, except the furtherance of his petty schemes, and when he reached the place chosen for the landing of the troops caused every difficulty imaginable. Lillingston, in spite of all obstacles, pushed on valiantly; the French were compelled to abandon their works in haste, but not before setting the match to their magazine. Wilmot made a rush for the place to

seize all the plunder before the troops could reach it. So precipitate was he that one of his captains and several men were blown up by the train of powder left by the enemy. The troops, furious at being defrauded, were on the point of mutiny, and were with difficulty persuaded to serve longer. An attack on Port de Paix was next attempted. But Wilmot as usual stood in the way of success. He refused to land siege materials except at places miles away from the points chosen for batteries. In the face of such obstacles, the troops worked heroically, and the French were finally compelled to evacuate the fort. Lillingston took immediate possession of the place, whereupon Wilmot attacked him with a superior force and took away all the plunder. This brought all operations to an abrupt end. Lillingston and his men, more dead than alive, were in no condition to continue hostilities under these conditions, and Wilmot certainly had no intention of staying with them any longer. Intent upon making the most of his voyage, he continued his cruise alone. But he was not destined to see the fulfilment of his dreams. Before he was able to reach England, down came the yellow fever, sweeping away the commodore, his accomplices, and three-fourths of his force (50).

The fate of Jamaica now appeared sealed. The helpless state of the island, its position and absolute inability to act in its own defence in case of danger, kept the inhabitants in continual fear for what was in store for them. Appeals to England for aid became more and more frequent (51). Yet no steps appear to have been taken by the authorities until November, 1696, when the disquieting intelligence came from France that a fleet was being fitted out for the West Indies. The Board of Trade immediately recommended the despatch of an engineer and fire-ships to protect Jamaica. These " re-enforcements " arrived in due time, but as usual proved quite useless. Capable as the engineer may have been, he could not understand the needs of the island as well as the people themselves, and besides, of what use were an engineer and his fortifications when there was no money to build them or men to man them? The Board of Trade at last appear to have realized this, and urged upon the King (December 3, 1696) the necessity of sending out a squadron. Preparations were accordingly begun to carry out these orders, and, after the usual delays and confusions, Vice Admiral John Nevill was despatched in command of a sufficient force to foil the enemy's plans (52). But he

arrived just too late. Cartagena had already been sacked, and the French fleet was on its way home laden with booty. Nevill had barely time to collect his forces and sail in pursuit; but he was finally obliged to give over the chase without having been able to bring the enemy to action. He then shaped his course for Havana to consult with the governor as to providing convoy for the treasure fleet lying there. The Spaniard, however, had become suspicious of the English since Wilmot's behavior two years before, and would not even allow Nevill to enter the harbor. Then followed the same old story. The crews were overcome by a raging fever; such great numbers died that Nevill steered for the Virginia coast in the hope of obtaining relief from the change of climate, but even here ill fortune pursued him, and he himself finally fell a victim of the plague (53).

The peace of Ryswick now brought hostilities to a close. Four years of truce elapsed before the next outbreak. But these years were by no means years of peace for the plantations. A new evil far more terrible than any they had experienced now came upon them. This was the evil of piracy. Hundreds of sailors thrown out of employment and a host of desperadoes set free on the cessation of the more legitimate industry of privateering found this new occupation too tempting to resist. The era of buccaneering, in which before this some patriotism at least had been evinced, was now followed by an era of unmitigated piracy. Some of the officials took early measures to stamp out the new evil, but in spite of the number of captures, it continued on the increase (54). It cannot be said, however, that the inhabitants of the plantations were not wholly to blame in this matter; too often were they in league with the pirates and smugglers, and not infrequently did the officials show a suspicious tenderness for the law breakers (55). Even the very naval officers that were sent out to cruise against the buccaneers in some cases violated their orders to the point of using them as means for blackmailing the colonists and traders they were supposed to protect—a fact that none dared complain about, for they were powerless before the captains with armed forces at their backs, and besides the Admiralty was known to countenance their behavior (56).

But even when the authorities were zealous in their efforts they found it extremely difficult to adopt repressive measures with the small forces at their command (57). "Upon view of our stores,"

wrote Governor Codrington from Antigua, "I find no ammunition, it being four or five years since the King sent us any powder," and no supplies had been received from the Victualling Office, "so that for the last six weeks our two men-of-war have been useless" (58). The Governor of Barbados not long after complained that he had but one "heavy, crazy vessel, miscalled a cruiser," at his disposal (59), with which he was powerless to annoy the pirates, though the latter were all but annihilating the trade of Barbados, while Governor Stapleton of the Leeward Islands only once enjoyed the luxury of having a man-of-war under a good officer at his disposal (60). Cases even occurred where cruisers were obliged to take to their heels when encountering the rovers (61). Repeated appeals and demands for aid were sent to England (62), for piracy had reached such proportions that the entire legitimate trade of America was threatened with ruin. Practically a state of war existed (63). Spanish corsairs plundered English vessels without possibility of redress from the authorities into whose ports the captures were brought (64). So serious did the situation become that in August, 1687, the King commissioned Sir Robert Holmes to proceed with a squadron to the Caribbean and suppress the outlaws. A special proclamation was issued to insure a proper co-operation between him and the royal governors, but the task of the squadron proved far more serious than had been anticipated. The presence of the ships for a while checked the evil, but only for a time. Holmes' agents met with so much opposition from the faction which had gained the upper hand in Jamaica that they despaired of success. Warrants were even issued for Holmes' arrest, and the suit brought against him by the pirates resulted in his being thrown into gaol (65).

The Board of Trade made every effort to obtain assistance for the traders, but it received little encouragement in answer to its recommendations. The Admiralty could not see the need for increased protection; one vessel was already cruising in Virginia waters and four were stationed in the West Indies (66). Besides, it could not spare the ships (67). The peace then reigning over Europe was but a momentary breathing spell; war might break out at any moment; it was therefore inadvisable to scatter the naval forces; and besides there was the question of expense, as money was none too handy. There the matter was dropped, and the colonies were left to look out for themselves as best they could.

The Admiralty's judgment with regard to the near approach of war was well-founded. A new cause for quarrel soon arose which culminated in the war of the Spanish Succession. The declaration of war came only on May 4, 1702, but preparations had not been delayed until then. King William's interest was not so much to dispute the claim of Philip as to seize such of the Spanish possessions in America as would increase the commercial and colonial ascendancy of England. The main efforts of his fleets were to be directed against America. Subsequent causes led to a change in these plans. Before that decision had been reached, however, the Admiralty had already sent out a squadron of ten sail under Vice Admiral John Benbow. At the time of the arrival (November 3, 1701) of this armament in the West Indies there were, as we have already seen, only a few English men-of-war in these waters, while the French and Spanish were in considerable force. But Benbow was fortunate in meeting the French squadron under M. Ducasse before the latter could effect a junction with his ally. Every advantage lay now with the English as they outnumbered their opponent. Benbow's captains, however, refused to engage the enemy, and the latter was allowed to escape after having been within the gasp of a superior force for five days (68).

Four other expeditions were despatched to the West Indies during the course of the next eight years (69), but, like their predecessors, they, one and all, failed signally to accomplish their purpose, and after repeated disgraces, disasters, and tremendous expenditures of lives and money by England, the French were as formidable as ever. "When had we an opportunity or at least when was there any attempt made by us," wrote the Secretary of the Admiralty, Josiah Burchett, in 1704, "from the beginning of the last war to this very time, where the advantage proved in any degree equal to the charge and inconveniences that did attend it? The injuries we did the French when Sir Francis Wheeler commanded in the West Indies were inconsiderable, and what have our successes been before and after that expedition? I doubt it was found that our squadrons came home in much worse condition than when they set forth, both as to men, and all other circumstances; and not having the good fortune to do any sensible injuries to our enemy, they had the satisfaction of knowing what inconveniences we involved ourselves in" (70). And it was much in this way that most of the naval expeditions, even in the century

following, were organized, until that greater War Minister, the elder Pitt, rose to power and accomplished what his predecessors never for one moment doubted their perfect competence to do.

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(38) Note: Just before starting Wright was recalled to England by orders from home; but at Barbados counter-orders were received with promises of re-inforcements. In January 1791, these "re-inforcements" came in the form of one man-of-war! (See Hannay, II, 69-71.) Cal. Sta. Pap. (A. & W. I.) 1689-92.
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THE OPERATIONS AROUND PORT ARTHUR

Part I. Including the Third Attack

THE OFFICIAL VERSION OF THE JAPANESE GENERAL STAFF

Translated by Captain W. T. Hoadley, U. S. M. C.

The Sea Battle Off Chemulpo

In December, 1904, negotiations between Japan and Russia were at their height. The conditions in Seoul also assumed signs of unrest. The cruiser *Saien,* which was engaged patrolling off the Korean coast, especially in observing the general conditions in Chemulpo harbor, was ordered to Mokpo to suppress a disturbance which had broken out between the Japanese settlers and the Koreans, and the cruiser *Chiyoda,* in addition to her duty in north China, was ordered to take up the *Saien's* duty. On December 18, the *Chiyoda* proceeded to Chemulpo and received orders to remain anchored in that harbor. In January, 1905, the foreign ships anchored at Chemulpo and sent landing forces to Seoul for the protection of legations and resident subjects. The Russian ships, the *Boyarian* and *Giliak,* which previously had been at anchor in Chemulpo harbor, proceeded to Port Arthur, leaving the *Variag* the only Russian ship in Chemulpo. About January 18, the *Koreits* entered the harbor and anchored with the *Chiyoda* between them. On the 31st they again changed their anchorage to the eastward. The captain of the *Chiyoda,* in order to prepare for emergencies, on February 3, changed his anchorage to the mouth of the channel which passed the Chemulpo wharves, and made arrangements to escape. On February 5, receiving notice from his home government that relations had been severed, he was ordered to proceed to Sasebo and join the fourth division. On the afternoon of the 7th, making secret preparations and obscuring his plans skillfully, at 11.55 p. m., he slowly raised anchor, under cover of darkness, left the harbor and at 30 minutes passed midnight proceeded to Baker's Island.

THE FOURTH DIVISION ENTERS THE HARBOR

On February 7, Admiral Uriu, commanding the second division, met the first division in Shingle Channel. From a late report he was certain that the Russian ships *Variag* and *Koreits* were still at anchor in Chemulpo harbor. On the same day at 4.30 p. m., separating from the main fleet, he proceeded to Baker's Island in command of the fourth division, the battleship *Asama,* the ninth and fourteenth destroyer flotillas, and the *Kasuga, Kyushiu Maru* and the army transports. At dusk while proceeding northeast of Hachibito (Island) the *Takachiho,* the leading ship, rammed a large whale, and as the blood stained the water, the crew, considering this a good omen, cheered vociferously. At dawn of the 8th, in the vicinity of Baker's Island, the commander-in-chief received a wireless from the *Chiyoda,* and later, falling in with that ship, was able to get more detailed conditions of the Russian ships. Knowing the general conditions, he decided he must land the troops at once at Chemulpo. Arriving in the vicinity of that port he ordered the commanding officers of the various ships to report on board the flagship and informed them of the various movements to be taken by their respective ships. He signaled the general, who was in temporary command of the troops, that he wished to land the troops as quickly as possible. At 2.15 p. m., he proceeded to Chemulpo in the following formation: In a single line ahead the *Chiyoda, Takachiho, Asama* followed by three army transports and the *Naniwa, Akashi* and the *Niitaka* following astern, and on the left flank abreast of the three leading ships were the destroyers *Aotaka, Hato, Karigane* and the *Tsubame.*

At 4.20 p. m., arriving in the vicinity of Hachibito, the *Chiyoda* and *Takachiho,* leaving the line, advanced. The ninth torpedo flotilla followed after these two ships. The *Asama* was delayed by reason of guarding the head of the transports. At this time the *Koreits,* leaving the harbor, and the *Chiyoda* and *Takachiho* advancing rapidly drew near to each other and the *Koreits* passed to port of these two ships. The *Asama,* in order to protect the transports, sheered to port and took position between the *Koreits* and the transports. The ninth flotilla, when they observed the *Koreits* on the port beam, changed course. The *Aotaka* and the *Hato* cruised to port and the *Karigane* and the *Tsubame* to starboard. The *Tsubame* ran upon a shoal. The other three boats,

continuing their course, arrived in the vicinity of Hachibito. The *Koreits* at this time was about to cross ahead and to starboard, and observing the destroyers drawing near, opened fire. This shot which was fired at 4.40 p. m. was the first of the naval war of 1905 and 1906. The *Asama,* observing this, at once reported to the flagship *Naniwa,* " The *Koreits* has opened fire." The transports were ordered to withdraw at once and the *Asama* was about to proceed to the open sea when the *Koreits* changed her course. The *Asama* then resumed her former course. The *Naniwa, Akashi* and *Niitaka* also changed course slightly to starboard and entered the harbor.

Outline of the report sent by the captain of the *Koreits* to the captain of the *Variag* saying: " My ship after receiving a secret communication from the Russian consul in Seoul, and receiving your permission by signal, I weighed anchor and left for Port Arthur at 3.40 p. m. on the 26th (February 8). Fifteen minutes after my departure I discovered Japanese ships on my bow, which I at once signaled to you. I recognized at this time that the Japanese were cruising in two lines ahead, the right flank being composed of cruisers and the left flank of four destroyers. As my ship approached the Japanese boats the torpedo-boats quickly changed course to port and the cruisers slightly to starboard which forced me to cruise between them, and at this time the Japanese cruisers trained all their guns abeam, removed their gun covers and stationed their gun crews. The torpedo-boats did not remove their covers from the torpedo-tubes. The second ship of the right flank was running parallel to us and an armored cruiser, which was the rear ship, suddenly leaving the line, took a course at right angles to my ship. The torpedo-boats running astern of my ship took position on both sides and at the same time removed the covers from the torpedo-tubes. This undoubtedly was a scheme to keep us in the harbor. Not knowing of the severing of relations between our government and the Japanese, I determined to return to my anchorage."

COVERING THE LANDING

The fourth division at 5.30 on the 8th arrived at anchor in Chemulpo. The *Chiyoda, Takachiho* and the ninth flotilla anchored southeast of the *Variag.* The disembarkment of the transports was begun under the protection of the various ships. The

Asama was drifting south of the Russian ships. The *Naniwa*, *Akashi* and *Niitaka* cruised around the harbor. The *Akashi* then anchored in the vicinity of the transports and covered them. The *Naniwa* and the *Niitaka* left the harbor at dusk and joined the fourth flotilla, temporarily anchored at the rendezvous. At sunset the *Asama* also left the harbor and joined the *Naniwa* and the other ships. At this time, besides the Russian cruisers *Variag* and *Koreits* and a merchant ship, there were in Chemulpo harbor the English cruiser *Talbot* of 5600 tons, the French cruiser *Pascale* of 4015 tons, the American gunboat *Vicksburg* of 1000 tons, the Italian ship *Elba* of 2737 tons and a *Korean* ship of 3435 tons. At 2.30 a. m. the following morning, the 9th, the transports, with the exception of one ship, having completed the disembarking, proceeded to the mouth of Chemulpo harbor. The remaining ship left at 10 o'clock, having been held up by the tide.

THE DEPARTURE OF THE RUSSIAN FLEET

Admiral Uriu, receiving a report from the captain of the *Takachiho* that the disembarkation had been completed at 10 p. m. February 8, on the following morning at 6 a. m. sent an official proclamation by his aide, passing through the Japanese and Russian consuls to the senior captain of the Russian ships in Chemulpo harbor, demanding that he leave the harbor by noon of the 9th with his ships. If this were not agreed to he would be forced to bombard him in the harbor. Moreover, he notified the English and Chinese consuls as well as the Korean subjects through the Japanese consul of his intentions. He informed the senior officers of the English, French, Italian and Korean ships that the attack would last until 4 o'clock in the afternoon and requested that, as it was difficult to assure no loss to foreign ships, they remove to a safe anchorage until that time. At 5 in the morning of the 9th the torpedo-boat *Kasasagi* was dispatched to the *Chihaya* to work in company with that ship in patrolling outside the harbor. Deciding on the disposition of his other ships, he awaited the departure of the Russian ships from the harbor. The *Takachiho* and *Akashi*, engaging in the duty of covering the disembarking of the troops, with the transports about 7 o'clock left the anchorage at Chemulpo. The *Chiyoda* weighed anchor, at 9.23 arrived at the eastern ship anchorage of Philip Island. The ninth flotilla took on coal and water and cruised to the mouth of the bay, but the captains of the

foreign ships jointly raised an objection to the changing of the anchorages and the attitude of the Russian ships seemed to show that they would not leave the harbor, but at 10 minutes past noon the *Asama,* which was cruising close in shore, discovered in the far distance the *Variag* and the *Koreits* leaving the harbor and reported this fact to Admiral Uriu.

THE BATTLE AT THE MOUTH OF THE HARBOR AND THE SURVEILLANCE OF THE ENEMY

At 10 minutes past noon of February 9, when the report from the *Asama* was received that the Russian ships were leaving the harbor, Admiral Uriu ordered each ship to carry out its prescribed duties. The entire fleet at once made battle preparations. At this time the Russian ships were cruising about four sea miles north of Hachibito and showed their intention of giving battle by their battle-flags flying at the masthead. Both ships were cruising slowly. At this time the *Asama* and *Chiyoda* were cruising in the lead. The *Naniwa* and the *Niitaka* following, and the *Takachiho* and *Akashi* in the rear. The fourteenth flotilla (with the exception of the *Kasasagi* which was engaged in scout duty with the *Chihaya*) were on the unexposed side of the *Naniwa,* waiting an opportunity to attack. The weather at this time was clear, and although there was a southeast breeze there was hardly any sea. The *Koreits* was on the starboard side of the *Variag.* At 15 minutes past noon when the distance became 7000 meters the *Asama* discovered that the enemy was crossing ahead of the column to port and at 20 minutes past opened a severe fire against the *Variag,* which ship at once returned it. The *Asama* changing course to starboard, having the enemy on her bow, continued a severe fire. The *Chiyoda* was principally engaged with the *Koreits.* The *Naniwa* and *Niitaka* also exchanged fire. The *Takachiho* and *Akashi,* when the opportunity presented itself, opened up a slow fire. The various ships advanced cautiously to avoid the shoals. The firing becoming more accurate, large shells struck the *Variag* and produced flame and smoke from that ship. The enemy's fire became ineffective. The *Variag,* changing her course to starboard, disappeared behind Hachibito and Admiral Uriu ordered the *Asama* to give chase. The *Asama,* increasing her speed, pursued the *Variag.* The *Chiyoda* for a time took part in the chase but on account of insufficient speed gave up and joined the *Naniwa*

and *Niitaka*. The *Asama* alone pursued, continuing a severe fire, and the *Variag* seeming to be greatly damaged, having a list to port and being enveloped in flames, escaped into Chemulpo harbor, the *Koreits* following her. At 1.15 the *Asama*, because she had drawn near to the Chemulpo anchorage, ceased fire and changed course. Each ship proceeded to Philip Island.

As none of the Japanese ships had been hit by the enemy no loss was caused.

OUTLINE OF THE REPORT OF THE CAPTAIN OF THE "VARIAG"

When the noon meal was finished, mustering the crew, I gave verbal orders, that as I had received notice from the Japanese commander demanding that we leave the harbor by noon as he intended to open fire, our determination, of course, is to leave the harbor and fight to the bitter end with our lives and ships against the superior Japanese forces. With this intention, believing in God, you must fight for our Emperor and country (cheers). The band playing the national air, the *Variag* leading and the *Koreits* following, stood toward the harbor entrance. The Japanese fleet under the command of Admiral Uriu was commanding the channel and the flotilla was cruising in the vicinity. The *Asama* first opened fire and the other ships followed. We answered at a range of 45 chains (one chain 182.8 meters). The first Japanese shell hit and smashed the upper part of our bridge and caused a fire in the chart room. Several men were killed and wounded. The enemy's shots hitting one after another put five 6-inch guns and nine small caliber guns out of commission. Fire broke out in various places. When Hachibito appeared abeam one shell struck and smashed the steering gear tube. Another shell hitting the foremast exploded, the fragments entering the conning tower and wounding my head. Several of the crew in the vicinity were killed and wounded, and two guns were placed out of commission. In addition one boiler got adrift and became leaky. Wishing to get out of the fire zone in order to make temporary repairs to the steering gear and to extinguish the fires, I attempted to turn the ship's head but the movement was not well executed. When we reached Hachibito I gave orders to retreat, but the range becoming closer and the accuracy of firing increasing, the ship was hit by a large shell on the port side causing her to take much water. We used all means to stop the leak but the hull listed more and more. Continuing the fire with the after guns, we made the anchorage.

REPORT OF THE "KOREITS"

In accordance with your signal I weighed anchor and preceded you at half speed, firing in the meantime. Then I took my position astern of you. As the range was great and not wishing to waste ammunition I ceased firing for a while but as the range became shorter I again opened fire. At the time I passed Hachibito I read your signal, "Change course to starboard." I observed your steering gear was blocked and not wishing to enter your line I threw my wheel hard aport to describe a turning circle of 270 degrees. I continued the firing and followed you to the anchorage. My ship was not hit.

DISPOSITION AFTER THE BATTLE

February 10 at dawn, after the various torpedo-boats having returned from picket duty, Admiral Uriu dispatched the *Chidori* and *Kasasagi* to Chemulpo to investigate the enemy's condition. At 7.30 a. m. with the rest of his ships he proceeded to the outside of Chemulpo harbor. On the way he dispatched the *Niitaka* to Hoto (Island) and ordered her to keep a strict watch. At 10 o'clock he reached the prearranged anchorage. He found there the *Kasuga Maru, Nikko Maru* and the army transports which had carried the troops. Although the condition of the battle had been made known to the combined fleet operating around Port Arthur by wireless, Admiral Dewa was able now for the first time to tell in detail the victory gained. Shortly after noon the first, second and third divisions entered the harbor and all together joined in the celebration of the victory. As there were indications of bad weather, Admiral Uriu ordered the ships to make preparations to meet it. The ninth flotilla was directed to proceed to Masampho harbor to ride out the gale, and the other ships sought suitable anchorages. The *Chiyoda,* which had the duty to make a close inspection of the enemy's condition, at dusk approached the anchorage of the *Variag*. Very little of that ship appeared above the water. The *Koreits* and another ship were sunk northeast of the line of the foreign ships and only the yard-arms and tops of the stacks appeared above the water. Thus the Russian ships at Chemulpo were entirely destroyed and their crews were distributed aboard the foreign ships. The following day being a national holiday, and as it was war time, the ships were dressed in lieu of full dress. At noon the national salute was fired. The *Chiyoda,*

after this ceremony and expressing thanks to the commanders of the foreign ships, left the harbor and proceeded to the anchorage of the fourth division. Night coming on, the position of the flagship, the *Naniwa,* not being clearly known, the *Chiyoda* anchored temporarily northeast of Hoto. Proceeding early the next morning, she met the *Naniwa,* which was proceeding to Chemulpo. Previous to this Admiral Uriu entrusted the duty of looking after the Russian ships to the Japanese consul, and feeling the necessity to aid the survivors who were distributed aboard the foreign ships on the morning of the 13th dispatched an officer to make arrangements. Communication was kept up by means of a torpedo-boat. After a conference between Admiral Uriu and the Japanese officials and the officials and captains of the foreign ships, it was agreed to parole the Russian survivors on the following conditions: They were not to engage in the war again and not to come north of Shanghai during hostilities and that all would be sent to ports south of Shanghai. The French ship *Pascale* with 216 men and officers of the *Koreits* and *Variag* as well as the Russian officials and guards proceeded to Shanghai, and after landing the officials at Shanghai proceeded to Saigon. The English ship *Amphitrite* with 275 men of the *Variag* and 53 other survivors on the 20th proceeded to Singapore. The Italian ship *Elba* with 181 men of the *Variag* proceeded to Hong Kong. As there were 24 severely wounded men the Russian officials through the English minister, Jordan, petitioned the Japanese minister, Hayashi, that these men be treated at the Red Cross Hospital at Chemulpo and this request was granted.

THE FIRST ATTACK ON PORT ARTHUR

THE ADVANCE OF THE COMBINED FLEET

On February 6 the combined fleet left Sasebo naval station and joined in Shingle Channel on the 7th at 3 p. m. As the condition of the Russian ships at Chemulpo and Port Arthur was known, Commander-in-Chief Togo issued his orders for the fleet. At this time to the southward of the fleet there appeared a steamship cruising south. Admiral Kamimura ordered the *Azuma* to overhaul her, and as it proved to be a Russian ship it was captured and convoyed to the naval station by the *Chihaya.* The third division already for the purpose of reconnaissance had proceeded inde-

pendently with increased speed to Shotei Island. The fourth division with orders to proceed to Chemulpo followed. Commander-in-Chief Togo with the first and second divisions and the flotillas at 5 o'clock proceeded to Port Arthur. The third division arriving at Shotei Island at 8 a. m. the 8th engaged in reconnaissance, but seeing nothing material joined the main fleet at 11 o'clock. The fleet proceeding at 6 p. m. arrived at the southeast of Round Island. The flotillas were ordered to prepare for an attack by a signal reading, " Attack as previously arranged. I pray for your success." The commanding officer of the first flotilla answered, " We expect sure success." Amidst the cheers of the entire fleet the first, second and third flotillas proceeded towards Port Arthur and the fourth and fifth flotillas towards Dalny Bay. They were soon lost in the dusk of evening. The main fleet then took the course previously arranged.

THE NIGHT ATTACK OF THE FLOTILLA

February 8 at 6 p. m., the first, second and third flotillas, with only the stern lights burning at night, shaped their course toward Liau-ti-chan Promontory. At 10.30, at a distance on the starboard beam, observed a bluish-white flame appearing and disappearing in the darkness. The commander of the first flotilla thought it to be the searchlights of the Russian fleet off the entrance of Port Arthur. Advancing on the same course about 20 minutes, he again observed two more lights on the port bow. Decreasing his speed for a short while and observing them carefully found them to be lights on two destroyers of the enemy which were on patrol duty and which were on a course about northeast. The Japanese boats extinguishing their stern lights, shaped their course to port to elude these. The *Oboro,* the second boat of the second flotilla, on account of the stern lights being extinguished, collided with the *Ikazuchi,* the leading ship, and damaged her bow to such an extent that she was unable to continue. The third boat, the *Inazuma,* was blocked by the *Oboro* and lost sight of the *Ikazuchi.* Thus the entire second flotilla was separated. The third flotilla also, losing sight of the leading flotillas, was forced to operate independently. The first flotilla, after eluding the Russian boats, resumed her original course and at 11.08 verified their positions by the light on Liau-ti-chan Promontory. Later, observing the searchlights of the Russian ships, decreasing their speed they advanced cautiously.

At this time it was 20 minutes past midnight and the moon had not risen. Only the searchlights of the Russian ships lighted the sea, and the dim forms of many large ships could be seen. The flotilla commander gave orders to attack at once. The *Shirakumo* leading, cruising to port attacked a Russian ship with three stacks. The time was 28 minutes past midnight. Next she attacked a ship with two stacks and with full speed retreated south. It was afterwards discovered her torpedoes had exploded. The second ship, the *Asashio,* following the course of the *Shirakumo,* attacked a ship of the *Peresviet* type and later a ship of the *Retvisan* type, and, noticing that she had made a hit on that ship, retreated to the SSE. At this time the enemy became aware of the attack and each ship becoming very active a great number of shots dropped around the flotilla. The third ship, the *Kasumi,* at 33 minutes past midnight, made an attack on a ship with two masts and three stacks, and followed this with an attack on a ship of the *Pallada* type and, under a heavy fire, retreated to the southward. The rear ship, the *Akatsuki,* at 33 minutes past midnight, changing course to port, on a course to the westward, attacked a ship of the *Retvisan* type, and under a heavy fire, after attacking a ship with two masts and three stacks, passed out of the enemy's range and cruised to the south at full speed. The *Ikazuchi,* acting alone, advanced on a course which would bring her off the entrance of Port Arthur. At five minutes past midnight, fixing her position by the light on Liau-ti-chan Promontory, she changed her course to true north, and cruised at half speed. At 30 minutes past midnight, drawing near to the enemy's line of ships, she gradually increased her speed, and at 35 minutes past midnight quickly changing her course to starboard discharged a torpedo at a ship with two masts and three stacks and retreated at full speed. During the retreat she received fire from a ship of the *Askold* type but all the shots passed over her deck. The third flotilla, which had become separated from the first flotilla, observed lights in a northwestern direction, and, thinking it must be a ship of the enemy, stopped their engines and watched their movements. At this time two destroyers approached and they proved to be the *Oboro* and the *Inazuma* of the second flotilla. The *Inazuma* reported to the commander of the third flotilla that as the *Oboro* had become damaged and could not proceed at full speed she would be unable to partake in the attack, and requested that the *Inazuma* be attached to the third flotilla. As

the whereabouts of the *Sazanami,* the rear boat of the third flotilla, was unknown, the flotilla commander substituted the *Inazuma.* Heading for the searchlights which were previously seen, in a short time discovered a unit of the enemy's ships at anchor. At this time the leading flotilla seemed to have carried out their attack as all the enemy's ships using their searchlights had opened a severe fire. The commanding officer of the third flotilla, considering this a good opportunity, cruising rapidly at 30 minutes past midnight, the leading ship, the *Usugumo,* veering to port, attacked a ship of the *Diana* type, then attacked a ship to the westward of the above ship. The second ship, the *Shinonome,* following the *Usugumo,* at 42 minutes past midnight, veering to starboard, discharged a torpedo. Then both ships, under a heavy fire, at full speed retreated to the southeast. The rear ship, the *Inazuma,* passing between the two leading boats, veering to port, discharged a torpedo at a ship of the *Retvisan* type and retreated to Round Island. The *Sazanami,* the rear ship of the third flotilla, having become separated from the other ships, about 11 p. m. on the 8th, discovered two lights on her bow, and headed for these, thinking they were her companion boats, but as they proved to be two of the enemy's destroyers, changed her course. Wishing to deliver an attack, she proceeded to the lighthouse at the entrance of Port Arthur. At this time the heavens were aglow with the searchlights of the enemy, and two of the enemy's ships had hoisted red lights. At 1.25 a. m. on the 9th, she approached a ship of the *Poltava* type and delivered an attack. The *Oboro,* the second ship of the second flotilla, which had damaged her bow, decided that as her movements were impeded, she would block the movements of the other ships and that the damaged bow would betray her position by throwing up so much water, left the line and attempted to make temporary repairs, but found that she would not obey her helm, so stood towards Port Arthur. At 1 a. m. on the 9th, she made out the entrance of the harbor from a distance. To her the attack seemed to have been completed as the lights were becoming more and more dim and the firing had ceased. The vicinity of the entrance presented a lonely appearance. At 1.45 p. m., slowly advancing, she discharged one torpedo and then made the best of her way to the southward.

As already mentioned, the first, second and third flotillas, having finished their duties, proceeded to return. Falling in with each

other, one after another, assembled off the northwest coast of Korea and the following morning anchored in the vicinity of Chemulpo harbor. The results of the attack it is said were as follows: The *Tsesarevitch* had her steering engine room destroyed, and sea water entering caused her to list about 18 degrees to port. The *Retvisan* received a large hole in the vicinity of the pump room below the water-line. The cruiser *Pallada* was pierced amidship below the water-line in the vicinity of her engine room.

Viceroy Alexiev reports as follows: "January 26 (February 8), at midnight, the Japanese destroyer flotilla made a surprise attack on the Russian ships outside of Port Arthur. Our batteries and the battleships *Retvisan* and *Tsesarevitch*, as well as the first-class cruiser *Pallada*, were damaged. The degree of damage is now being investigated and I will report later."

In a further report he says: "The three ships which were damaged on January 26 (February 8) are still afloat. The steering gear of the *Tsesarevitch* was damaged. The *Retvisan* was damaged in the vicinity of the hand pump below the water-line. The *Pallada* received damages in the vicinity of her main engine. The killed and wounded are few. Enlisted men, two killed, 29 drowned and eight wounded. After the attack we discovered two unexploded torpedoes of the enemy."

Report of a Russian captain: "I heard secretly from the Viceroy's diplomatic aide at the house of Mrs. ———, the wife of Admiral ———, on January 26 at 4 p. m., that the ministers of both countries were recalled. Previous to this our ships, by orders of the commander-in-chief, every night conducted a torpedo defense, but did not spread torpedo nets. We never took the situation seriously, even at night alarms. We did not load the main battery guns. The whole crew slept with their clothing removed, and on some ships they were allowed to sleep in their hammocks. From the night of the 26th to the 27th, the ships outside were coaling, and although it was certain that we could not avoid war, we made no preparations. On the night of the 26th, two destroyers received instructions that providing they saw anything suspicious not to fire but to return and report to the commander-in-chief. Although these boats met the Japanese flotilla they carried out the order literally and returned to the fleet about the same time that the enemy appeared. About the time the report was communicated to the flagship, the *Pallada* was blown up. The *Retvisan* for the

first time knew of the attack when a torpedo exploded under her bottom. The *Pallada* grounded under the western battery and the *Retvisan* attempting to enter the harbor grounded on a ledge in the passage and blocked the entrance. The *Tsesarevitch* following, and wishing to avoid the *Retvisan,* also grounded. When the moon arose the conditions in all directions became very quiet. The destroyers, other than the two which were engaged in patrol duty, were in the inner harbor and were ordered to get up steam and pursue the enemy, but after leaving the harbor saw no traces of them and the next morning returned."

Report of a Russian captain: "As the 26th day of January was a church holiday we all celebrated it. The majority of the officers and crew were on shore and the wife of Admiral —— held a ball at their residence to which the higher officers of the navy were invited. The military officers had all gathered at the home of a military surgeon and his wife. Although firing was heard outside the harbor, they were led to believe it was the *Retvisan* holding night practice. No one became suspicious. The firing momentarily increased and when they received a signal alarm they realized for the first time the night attack of the Japanese. Being amazed, all hastened to their duties wherever they might be. Although the land forces hurried to their positions and endeavored to answer the fire, many were separated from their commands and even forgot to procure ammunition for their guns. Two or three batteries had neither shells nor powder. The whole night was passed in panic, fearing that the Japanese army was landing and that we were unable to cope with them."

THE BATTLE CHALLENGE OF THE COMBINED FLEET

February 8 at 6 p. m., Commander-in-Chief Togo, ordering the destroyer flotilla to proceed him with the first, second and third divisions, shaped his course to Port Arthur. As he wished to know the enemy's condition he ordered Admiral Dewa with the third division to reconnoiter outside the harbor from 8 a. m. the next morning. If he met the enemy in force he was to invite them to the south of Encounter Rock. The third division at 7 a. m. gradually increasing the speed drew ahead. The main fleet advanced as before and by unintelligible induction by wireless machines Admiral Togo knew they were drawing near the enemy. Ordering each ship to hook up all boilers at 8.06 he changed course and proceeded

to Encounter Rock. One hour passing they met a ship flying the Japanese flag which hoisted a signal which read " Consular." He proved to be the Japanese consul at Cheefoo and had gone the day before to Port Arthur and Dalny to rescue Japanese subjects and was now on his way back to Cheefoo. This ship-load of Japanese coming across ships of their own country in these far seas, their joy knowing no bounds, increasingly shouted " Banzai " as they passed to port. The third division which previously had received orders to reconnoiter Port Arthur when they drew near, in the mist, discovered yard-arms and when they drew to within 7000 yards made out 12 large ships, gunboats, torpedo-boats and mine planters of the enemy outside the harbor. Three of these ships seemed to be the ships which had received the night attack of the Japanese flotilla. One had a list and was aground. Most of the others, except the *Askold* and *Bayan* which were slowly moving, seemed to be anchored. The destroyers were cruising among the larger ships. At once Admiral Dewa proceeded for the anchorage of the main fleet and reported by wireless to Admiral Togo that the greater part of the enemy's fleet were outside the harbor, and although he approached to within 7000 meters they did not open fire. He considered it a good time to attack as some of their ships seemed to have been damaged by Japanese torpedoes. At this time, seeing a steamer to the southward, she was overhauled and proved to be the Russian ship *Manchuria* which was at once captured and convoyed to the south by the *Tatsuda*. Joining the main fleet at 11 a. m. at a position 20 sea miles southeast of the entrance of Port Arthur on a course fixed at NW. by W½W. in single line ahead proceeded to Port Arthur. Gradually the speed was increased, and signal was made that from now on the object was to attack the main force of the enemy. A short time passing the *Diana* crossed ahead of the column but quickly escaped and at 11.30, at long range, fired her stern guns three times but did no damage. At once Admiral Togo, gathering his staff on the forward bridge, ordered the battle-flag hoisted and gave orders for battle.

The day was misty and the land was obscured. The wind being very light the sea was smooth. Drawing near to 10,000 meters the enemy's ships were observed to be in a very complicated formation. Hereupon Commander-in-Chief Togo gave orders that each ship in turn would open fire to starboard. When the range became about 8500 meters the course was changed to true west, and the

Mikasa at 11.55 a. m. fired the first shot from her forward 12-inch gun. The shot of the *Mikasa* drew the fire of the enemy both from the ships and the land batteries. When the range became nearer the *Mikasa* for the first time fired her starboard broadside, the other ships following. The second ship, the *Asahi,* concentrated her fire on a ship of the *Peresviet* type. The third ship, the *Fuji,* and the fourth ship, the *Yashima,* made the cruiser *Bayan* their target. The fifth ship, the *Shikishima,* concentrated on the center ship. The rear ship, the *Hatsuse,* challenged the ship nearest her. The second and third divisions, changing course to port, took the same course as the first division. Both fleets were fighting fiercely and the shells were flying everywhere. The enemy's ships as before were still at anchor. The cruiser *Askold* which was in the east and the *Bayan* in the center had only a little headway. The cruiser *Novik* in the west alone advanced to the attack. The land batteries kept up a continuous fire with their howitzers and other guns. At 11 minutes past noon a 12-inch shell from the *Mikasa* seemed to have struck a ship of the *Pobieda* type and at the same time dense black smoke arose and white smoke gushed out of the center stack. The shots from the various ships finding a mark on the enemy's ships and those dropping on shore and on the sea seemed like flashes of lightning. Some of the enemy's ships were afire. Dark smoke obscured the sunlight. The enemy's shots dropping near the Japanese fleet gradually increased in number and about 11 minutes past noon one 10-inch shell, which struck near the starboard side of the *Mikasa,* ricochetted and exploded under the mainmast. The fleet engineer, one staff officer, paymaster, one midshipman and three enlisted men were wounded, and a part of the after bridge was carried away. Shortly after another ricochet shot, grazing the mainmast, cut the halliards of the battle-flag and the flag dropped into the sea. A second battle-flag was soon hoisted and this also was pierced by a shot. At 12.15 the firing became more severe and a large shell from a shore battery killed a gunnery officer who was on the forward bridge of the *Fuji* engaged in directing the fire, and wounded a midshipman, one signal petty officer and two seamen. This shell also passing through the forward casing smashing the stack and exploded, damaging a boat on the port side, killed the turret officer and wounded five sailors. A shell from a 7.5 centimeter gun struck the after watch tower ricochetting, passed over the after shelter

deck, wounded a midshipman and damaged the wireless outfit. As the *Mikasa* had already approached to the foot of the Liau-ti-chan Promontory, the range became too great and Commander-in-Chief Togo, at 20 minutes past noon, ordered a change of front 8 points to port and the ships in succession followed the movements of the flagship. One of the enemy's batteries seemed to have considered this 8-point change most advantageous for an attack as large and small shot fell in the vicinity of the fleet. One shell coming from the starboard side aft hit the forward boat deck, wounding the navigator, forward turret commander and three seamen. Another shell hit on the starboard quarter, exploded, and one fragment entering the lower deck pierced the commander's cabin, killing one midshipman and one seaman and wounding nine seamen. At 30 minutes past noon a 15-centimeter shell hit the forward stack of the *Shikishima* and exploded. Fragments flying in all directions caused damage to the forward derrick and the forward bridge. The navigator, one officer and 15 seamen were wounded. At seven minutes past noon each ship of the second division, one after another following the first division, took a course true west. At 12 minutes past noon the *Izumo,* the flagship of Admiral Kamimura, opened fire on the center of the enemy's ships. The second ship, the *Azuma,* following her, fired on a ship of the *Pobieda* type. The third ship, the *Yakumo,* concentrated on a battleship. The fourth ship, the *Iwaki,* fired at all the enemy's ships. The rear ship, the *Iwate,* concentrated on the *Bayan* which was operating in the center. The second division joined in the firing in concert with the first division. A short time passing when the first division changed course to port and the enemy's fire was concentrated on the second division. Shells fell all around this division. The *Azuma* changed her objective to a ship of the *Petropavlovsk* type. The *Yakumo* concentrated on the *Novik* which was operating in the west outside of the line. The *Iwate* concentrated on the *Askold* which was cruising slowly to the east. The *Iwaki,* after concentrating on the *Askold,* shifted her fire to the *Bayan,* then to two ships of the *Pobieda* type, and finally to one of the *Petropavlovsk* type. The shots that hit could readily be counted. Gradually the enemy's fire became weaker. At 26 minutes past noon Admiral Kamimura ordered the course changed to port and followed the first division. As each ship changed course to southwest the shells of the enemy dropped all around.

One shell pierced the battle-flag of the *Azuma*. Another shell struck the water off the starboard quarter of the *Iwate*, exploding, the fragments damaging the side of the ship. Another shell hitting the after turret, wounded the turret officer, one midshipman attached to the turret, turret captain and seven seamen. The *Yakumo* was struck in the forward main top and one midshipman manipulating the range finder was severely wounded. The *Novik* received a severe fire from the Japanese ships. Retreating she discharged a torpedo which passed across the bow of the *Iwate*. The *Iwate* at this time concentrated on the *Askold* and one shell striking aft of the mainmast of the *Askold* exploded and volumes of smoke arose. The third division entered the battle line about 15 minutes past noon. The *Chitose*, the flagship of Admiral Dewa, opened fire on the center ship of the enemy's line. The second ship, the *Takasago*, concentrated on the *Bayan*. The third ship, the *Kasagi*, concentrated on a ship of the *Sevastopol* type. The *Yakumo* concentrated on the ship nearest her. The *Takasago* and *Chitose* attacked the *Askold* which alone had drawn near. One shell struck the second stack of the *Askold* and another shell striking the forward stack dense black smoke arose. At 24 minutes past noon the *Chitose* attacked the *Novik*. The *Takasago* now concentrated on the *Bayan*. As the first and second divisions had drawn away from the battle line, the enemy's fire was concentrated on the third division. At about 25 minutes past noon the fire was most severe and Commander-in-Chief Togo signaled for the third division to draw out of range. Thereupon at 37 minutes past noon Admiral Dewa ordered all ships to change course 8 points to port. All the ships changing course to the southward withdrew from the engagement. At 45 minutes past noon lowering the battle-flags, following the flagship, cruised towards the entrance of Chemulpo harbor in the regular order.

THE RETURN OF THE COMBINED FLEET

Commander-in-Chief Togo, fearing pursuit of the enemy's destroyers, ordered the first and second divisions to proceed at full speed to the south to Shantung Promontory. He ordered the third division to cruise at will in the vicinity of Chemulpo. Himself with the first and second divisions, changing course and decreasing the speed, proceeded to the rendezvous. On the morning of the 10th, at 8 a. m., the third division was sighted on the star-

board hand in the far distance. Admiral Togo ordered this division to become the rear unit, forming single column in column ahead, proceeded. At 10.26 a wireless was received from Admiral Uriu stating that the two Russian ships in Chemulpo harbor were totally destroyed without any loss to his division. Then meeting with the fourth flotilla, which had been dispatched to Dalny, at 2 p. m. anchored at the entrance of Chemulpo harbor. Here was found the fourth division—the *Asama,* the *Chiyoda,* ninth and fourteenth torpedo flotillas, the *Nikko Maru, Kasuga Maru, Kinshu Maru, Tairen Maru, Otaru Maru, Heijo Maru, Genkai Maru,* as well as the *Tatsuda* which had convoyed the captured Russian ship *Manchuria.* The whole fleet celebrated the success of the opening battle.

THE SECOND ATTACK ON PORT ARTHUR

THE MOVEMENTS OF THE VARIOUS DIVISIONS

The main fleet and a division of it which had destroyed the enemy's ships at Chemulpo and also attacked them at Port Arthur, on February 10, gathered at the entrance of Chemulpo harbor. The following day being a holiday, it was observed properly. The day was cold but the sky was clear and the seas were calm and everybody's spirits were high. Commander-in-Chief Togo wished to make a second attack with one division before the enemy had time to make repairs and that day issued orders. The second and third divisions and fourth and fifth destroyer flotillas would engage in the reconnaissance of Shantung Promontory and the attack on Port Arthur. The first and fourth divisions would stay on the Korean coast to engage principally in preparation and patrolling. Here the second movement began. The third division (*Kasagi* absent) which received orders to stretch this cordon in the vicinity of Shantung Promontory, led by Admiral Dewa, together with the fourth and fifth destroyer flotillas whose orders were to attack the enemy, departed on the 11th at 5 p. m. Early the next morning they encountered a snowstorm, and a strong northwest wind blowing kicked up a heavy sea. At 8 a. m. Admiral Dewa ordered the *Takasago* to wait in the vicinity of Soi Chong Island and aid the fourth and fifth destroyer flotillas which had fallen behind. Himself with the *Chitose* and *Yoshino* at 11 o'clock anchored along the coast. The destroyers *Shiranubi* and the *Kagero* were already here, having proceeded ahead. The

Takasago, battling with the wind and waves, searched until dusk for the destroyers and being unable to find them returned and joined the division. The fourth flotilla escaped disaster by turning back to Chemulpo harbor. The fifth flotilla, cruising north, lost each other. The *Murakumo* and the *Yugiri* anchored east of Kokan Island. As previously stated the other two ships, the *Shiranubi* and *Kagero,* had arrived and joined the division. At 3.40 p. m. Admiral Kamimura of the second division reported by wireless that on account of the weather he was forced to change his previous plans. Admiral Dewa reported the position of the third division and the condition of the flotillas, and that he would carry out the former plans as soon as all his ships gathered and the weather permitted. The following morning the *Murakumo* and the *Yugiri* and a special service ship, *Kinsu Maru,* arrived. Now the entire fifth flotilla had joined but the division still waited for the fourth flotilla. In the afternoon the *Murasame* (fourth flotilla) arrived and reported that the fourth flotilla had begun operations. Admiral Dewa ordered that ship to proceed and notify the commander of the fourth flotilla to carry out operations at his discretion. With the third division and fifth flotilla he decided to proceed to Port Arthur the following morning, but for a number of days the bad weather continued. From 1 a. m. on the 14th there was a bad snowstorm, but although the weather was dangerous at 7 a. m. Admiral Dewa with the third division and fifth flotilla got under way. Coming across the *Murasame* he ordered that boat to join the fifth flotilla. The north wind, increasing in violence, kicked up a very high sea and the flotilla jumped about in a dangerous manner. The ships becoming coated with ice and the voyage becoming more and more perilous, it was decided to discontinue the advance and at 10.30 a. m., changing course, they proceeded toward the anchorage. Falling in with the *Harusame* (fourth flotilla) he ordered her to fall in astern of the *Murasame.* At 1 p. m. the anchorage was reached. At 7.40 p. m. the *Asagiri* joined. Previously this boat in company with the *Hayadori, Murasame* and the *Harusame* left Chemulpo about 8 a. m. the 13th. The *Murasame,* in order to take on coal and water, proceeded alone to the northwest coast of Korea and by so doing lost the other three boats. The *Hayadori, Harusame* and *Asagiri* proceeded to Port Arthur, but, being unable to cruise together, one by one became separated. The *Asagiri* alone proceeded north, but on account of

the fearful wind and snow squalls, and the mountainous sea, a danger arose that she might capsize, but in spite of this she kept on her course. Between 3 and 4 o'clock in the morning of the 14th she heard firing by the enemy. Proceeding south of Liau-ti-chan Promontory, then changing course, she arrived at a point about 1000 meters from the entrance of Port Arthur. As it was just before dawn and the snow fell fast, she was able to observe the enemy. Three of the enemy's destroyers seemed to be patrolling the mouth of the harbor. One ship was moving along shore off the west entrance. Discovering a ship to the northward which appeared to have no headway, and discharging a torpedo at this ship, she retreated at full speed. She received a fire from the shore batteries but no damage was incurred. Later she joined the third division. From the report brought by the *Asagiri,* Admiral Dewa learned of the enemy's disposition in a general manner and thought it best to operate on a new plan by joining the first division. February 15, at 11.40 a. m., with the third division and the fourth and fifth flotillas, leaving the northwest coast of Korea, started on his return voyage. At this time the *Hayadori* had not yet returned. He instructed the *Kinshu Maru* to remain behind until evening and if the *Hayadori* did not return at that time to proceed to Chemulpo harbor. Meeting the *Kasagi* he received orders from the *Asama* for him to try another reconnaissance of Port Arthur as soon as the weather became settled, but as he already knew the enemy's condition he wired this fact to Commander-in-Chief Togo. At 9.40 a. m. on the 16th, in company with the *Asama,* he proceeded to the southwest coast of Korea and joined the first division. At this time the *Hayadori* returned and reported she had carried out an attack on the enemy. The *Hayadori,* when she had become separated from her companion boats, cruised off the entrance of Port Arthur. During a severe wind and snowstorm, before dawn of the 14th, she discovered two of the enemy's ships, and under fire discharged a torpedo and retreated. Previous to this Admiral Kamimura of the second division and the scout ship *Chihaya* having been ordered to operate in the direction of Southeast Promontory left port at 8 a. m. on the 12th. The seas being high the *Chihaya* was unable to continue on her course and Admiral Kamimura ordered her to return to Chemulpo. On account of the lack of coal and water and other reasons, he gave up the reconnaissance around Port Arthur. Deciding to cruise south from Shantung

Promontory he changed course and proceeded. At 9.45 a. m. the 13th, changing course to true south, he reconnoitered around the enemy's ships until 5 p. m. From then, 5 p. m., he continued south and arrived on the southwest coast of Korea on the morning of the 14th.

PREPARATIONS OF THE FIRST DIVISION

Admiral Togo, after giving orders to the various ships that would engage in the second movement with the first division, first, second and third destroyer flotillas and the special service ship *Nikko Maru,* at 4.37 p. m. on February 12, proceeded to the southwest coast of Korea. He ordered the various ships under his command to overhaul batteries, engines, etc., and make such temporary repairs as were necessary. He received a report from the chief of staff that the twelfth army division, the advance guard, had already started their embarkation. Admiral Togo, wishing to protect the army transports and to examine the enemy's condition, on the 14th ordered the *Kasagi* and *Tatsuda* to patrol and observe the points which had been fixed upon and to report whether or not the route was safe. He ordered the *Asama,* at her convenience, to leave port and get in contact with the third division and deliver orders to Admiral Dewa to make a further attempt to reconnoiter Port Arthur. Shortly after Admiral Dewa returned and from his report Togo knew of the enemy's condition at Port Arthur. On the 17th, having received from the chief of staff information regarding the enemy's condition, he issued orders on the 18th relating to the blockade of the entrance of Port Arthur, as well as the bombardment of the inner harbor.

NOTE.—After the first attack at Port Arthur the enemy's ships barely made the harbor. The *Retvisan* was still aground. The military was disheartened and there was a panic among the citizens. Business was suspended and many citizens, taking their effects, left. The Chinese workmen, departing, left the dock yards short of men, and repairs on the ships were hampered. On February 11, a mine planter, engaged in planting mines in Dalny Bay, on account of the high seas accidentally struck a mine and was blown up and sank about 2000 feet from the shore. The captain, two officers, one engineer officer and 80 seamen lost their lives. A second-class cruiser, entering Dalny Bay from Port Arthur, struck a mine which exploded. Five seamen lost their lives. The captain, with coolness, anchored his ship and ordered all hands to abandon the ship. This same ship, on the 14th, swinging with the tide, again struck a mine and sank. In addition to this, on the 13th, two destroyers collided and brought about great damage. In this manner the belief in the navy by the citizens and officials became weakened and the military spirit was at a low ebb.

THE THIRD ATTACK ON PORT ARTHUR AND THE FIRST BLOCKADE

PREPARATION FOR THE BLOCKADE

Admiral Togo had ordered one portion of his fleet to carry out the second attack on Port Arthur. Himself with the main strength, on the southwest coast of Korea, made repairs, took on supplies and rested the crew. Wishing to blockade the entrance of Port Arthur, to cut off the enemy's operations and to threaten them by indirect fire, on February 18 he issued orders for a third attack. He ordered that by 3.30 a. m. of the fourth day after departure the blockade must be carried out. In order to destroy the torpedo craft of the enemy which would become a hindrance to the blockade and in order to rescue the men in the blockading fleet, he made the following assignments to the torpedo craft. The *Chidori* will be the attendant of the *Tenshin Maru*. The *Hayabusa* with the *Hokoku Maru*. The *Kasasagi* with the *Jinsen Maru*. The *Manazuru* with the *Buyo Maru* and the *Tsubame* with the *Busu Maru*. The fifth destroyer flotilla will be the advance guard and search for the enemy's scouts outside the harbor and attack them, and will also divert the enemy's attention by cruising to the eastward. The ninth torpedo flotilla (*Tsubame* absent) will cruise slowly to the mouth of Port Arthur along the shore from the east side of Liau-ti-chan Promontory and will pick up any men they find. The first destroyer flotilla will proceed together with the ninth flotilla, guarding the front of the blockading fleet. When the blockading fleet has reached the entrance of the harbor that flotilla will then guard the rear and later report to the main fleet whether or not the blockade is successful. The fourth destroyer flotilla, which is the advance guard of the second division, will proceed to the vicinity of Liau-ti-chan Promontory after dawn of the day of carrying out the blockade, and will be careful to pick up all survivors. The first, second and third divisions will proceed with the fourth destroyer flotilla until the day before the blockade, when they will separate. The first division will proceed to Encounter Rock and the third division will reconnoiter the entrance of Port Arthur. The second division, after passing Liau-ti-chan Promontory in company with the fourth destroyer flotilla, will then join the first division. When first it was seen that a clash with Russia was unavoidable, one of the early plans decided upon was the blockade of Port Arthur. It was

decided to carry out the blockade with the *Tenshin Maru,* the *Hokoku Maru,* the *Jinsen Maru,* the *Buyo Maru* and the *Bushu Maru.* The officers and engineers who would engage in this movement were already selected. Admiral Togo, thinking that the opportunity had arrived, issued the above orders. At the time of issuing the orders he called for volunteers among the enlisted personnel. At once, more than 2000 men volunteered. Among these there were some who applied by writing in blood drawn from their fingers. As the blockade was hazardous the admiral, fearing to lose so many men, after great deliberation finally chose only 67. On the 19th they were distributed among the blockading ships and proceeded at once to store the explosives and make the other necessary arrangements.

THE BLOCKADE

CARRYING OUT THE BLOCKADE

The fifth destroyer flotilla, which was the advance guard of the blockading fleet, at 5 p. m., February 23, increasing speed proceeded the blockading fleet and at 11.50 p. m. arrived under Liau-ti-chan Promontory. As the moon was in the sky there was a fear of being discovered by the enemy; therefore, waiting for the setting of the moon, drifted close under the promontory. The enemy using strong searchlights swept the sea outside the harbor. The flotilla, being warned, cruised slowly along the shore, keeping out of the rays of the searchlight. At 1.30 a. m. on the 24th, approaching the entrance they reconnoitered and found several ships and destroyers anchored near the shore in the vicinity of Gold Hill. Hereupon an attack was at once ordered. The *Kagero,* which was the leading boat, discharged one torpedo. The second boat, the *Shiranubi,* attacking a ship with two stacks, together with the *Kagero,* proceeded seaward. The third ship, the *Murakumo,* attacked a ship showing her broadside. The fourth ship, the *Yugiri,* finishing an attack, proceeded seawards. While cruising met with the *Murakumo,* which boat attempted to cross her bow. The *Yugiri* attempting to change course to port jammed her steering gear. After making temporary repairs proceeded on her way. The commander of the first destroyer flotilla, which was engaged in guarding the front of the blockading fleet, at 3.20 p. m. the 23d, dispatched the *Akatsuki* to a point off Liau-ti-chan Promontory with instructions to hoist a white light to be used later as a

cruising mark for the blockading fleet. He, leading the other destroyers and the fourteenth torpedo flotilla, took position on the starboard side of the blockading fleet, and the ninth torpedo flotilla became the rear guard. All together, covering the blockading fleet, proceeded towards the entrance of Port Arthur and arrived southeast of Liau-ti-chan Promontory at 30 minutes past midnight of the 24th. At this time the moon was setting and it became dark in all directions. The enemy were very active in the use of their searchlights. The blockading fleet for a time drifted to the southwest of Liau-ti-chan and watched for the opportunity to advance. Only the second section (*Hayabusa, Manazuru* and the *Tsubame* of the ninth flotilla added) of the fourteenth flotilla advanced. At the time when one of the enemy's batteries appeared abeam, turning to starboard, they reconnoitered the vicinity of the entrance but discovered none of the enemy. They stopped their engines about one sea mile southeast of the enemy. At 3.40, being picked up by the enemy's searchlight, they were fired upon. The enemy after a short while ceased firing. The blockading fleet under the shadow of Liau-ti-chan Promontory at 4.15 a. m., deeming it the time to attack, advanced. Coming out in view they entered into the zone of the enemy's searchlights and received a severe fire but continued to advance. The lights blinding the eyes of the sailors the leading ship ran on a shoal and was blown up. The second ship, receiving a warning from the leading ship to port her helm, changed course and entered the mouth of the harbor. The third ship, following the second, came alongside. The officer who commanded the fourth ship, the *Buyo Maru,* not knowing that the *Tenshin Maru* had accidentally stranded, and thinking by a signal on her masthead that she had arrived at the entrance of the harbor, shaped his course towards her, but on examining the land marks, soon found that he was out of position. At the time he was verifying his position the fifth ship, the *Bushu Maru,* having her steering gear damaged, lost her power of movement, and immediately an explosion occurred and she sank. The officer in command of the *Buyo Maru,* passing between the *Tenshin Maru* and the *Bushu Maru,* arrived at the entrance (western) of the port, and observing the explosion of the *Bushu Maru* deemed it time to carry out his part. Anchoring his ship, and opening the Kingston valves, he abandoned her. At this time the searchlights and the fire of the enemy were concentrated upon the *Hokoku Maru* and the *Jinsen*

Maru but both ships continued towards the entrance at full speed. The steering gear of the *Hokoku Maru* being damaged by a shell of the enemy before she arrived at the entrance, and a fire breaking out on board, she stranded on the shore under the lighthouse at the entrance of the harbor, her bow pointing to the northwest. The officer in command attempted to discharge the explosives on board, but the firing circuit having been damaged by a shell it was impossible to detonate the charge. Thinking that the fire on board would eventually bring about the explosion, with his crew he abandoned the ship. The *Jinsen Maru,* which was on the starboard side of the *Hokoku Maru* on a course true north, headed for the searchlights on Gold Hill, and as she was on the point of changing course she grounded, and in this position was destroyed. One seaman was killed and four seamen were wounded. The remainder of the crew took to the boats.

RESCUING THE CREWS OF THE BLOCKADING SHIPS

The *Chidori* and the *Kasasagi,* which constituted the first section of the fourth torpedo flotilla, followed the blockading fleet, and when they arrived at a point along the shore of Liau-ti-chan Promontory at a distance of about one and a half sea miles from the Eastern Cape, they separated from the blockading fleet. Cruising about in the vicinity they stood by to pick up the crews. When they saw the signal light on the *Tenshin Maru's* mast when she stranded and was destroyed at 4.28 a. m. on the 24th, they proceeded in that direction. The *Kasasagi* picked up some of the crew of the *Tenshin Maru* and the *Buyo Maru.* The *Chidori* searched for other boats but was unable to find them, and, after examining the entrance of the harbor to obtain information regarding the effectiveness of the blockade, returned at 9.30 a. m. and joined the third division. The *Manazuru,* the *Hayabusa* and the *Tsubame* of the second section, previous to this, under a severe fire of the enemy, were reconnoitering the entrance of the harbor. At a point south of Gold Hill they saw the blockading ships in the direction of the western entrance of the harbor and advanced in that direction. On the way they came across the *Kasasagi* and were informed that the majority of the crew had already been picked up, but they continued to engage in the search. The *Hayabusa* picked up the commanding officer and the crew of the *Hokoku Maru* at 6.30 a. m. in the morning and returned in company with the

Kasasagi. The *Manazuru,* seeing the *Hokoku Maru* burning at the entrance of the harbor, discharged a torpedo in order to sink her. The *Tsubame* was unsuccessful in her search. The ninth torpedo flotilla, which guarded the rear of the blockading fleet, at 4.15 a. m. was east of Liau-ti-chan Promontory. These boats waited until dawn and upon investigation of the conditions at the entrance of the harbor saw two ships stranded in the vicinity of the western entrance and one ship burning at the entrance of the harbor. Being unable to find any boats with the survivors at 9 a. m. joined the third division. The fifth destroyer flotilla, after having attacked a scout ship of the enemy, at the entrance of the harbor, cruised to the open sea. At 3.35 a. m. on the 24th, by the firing, it was known that the blockading fleet had advanced. Making for the entrance with the intention of diverting the enemy's fire, they were unsuccessful as the enemy seemed bent on destroying the blockading fleet. At 6.30 a. m., after having searched for survivors, joined the first division. The first destroyer flotilla carried out orders assigned them and at 8.30 a. m. joined the first division and reported to the commander-in-chief. The fourth destroyer flotilla, which was in advance of the second division, separated from that division at 2 a. m. the 24th and proceeded towards Liau-ti-chan Promontory. The object of this flotilla was to search for survivors but they came across only one empty boat. As they advanced to the entrance of the harbor, they were attacked by three destroyers and the land batteries of the enemy. They attempted to draw the destroyers of the enemy to the open sea, but being unsuccessful at last joined the second division. The commanding officer and 15 men of the *Jinsen Maru,* who had escaped in a small boat, headed along the eastern shore of Liau-ti-chan Promontory. On account of the great distance they were unable to get into communication with the rescuing destroyers. The boat being blown off to sea, they continued to the southward. Later, running in with a boat containing an officer and some men of the *Bushu Maru,* all were successful in joining with the main fleet.

OPERATIONS OF THE VARIOUS DIVISIONS

Admiral Togo, on February 20, began the third movement. The third division (*Chitose, Kasagi, Takasago, Yoshino*), the fifth destroyer flotilla (*Kagero, Murakumo, Shiranubi, Yugiri*), the blockading fleet (*Tenshin Maru, Hokoku Maru, Jinsen Maru, Buyo*

Maru, Bushu Maru), and the special service ship at 8 a. m., and the first division (*Mikasa, Asahi, Fuji, Yashima, Shikishima* and *Hatsuse*) at noon, and the second division (*Izumo, Azuma, Asama, Yakumo, Tokiwa* and *Iwate*) and the fourth destroyer flotilla (*Hayadori, Asagiri, Murasame* and *Harusame*) at 1 p. m., and the dispatch boat *Chihaya,* one after another, left the southwest coast of Korea. The ninth torpedo flotilla (*Aotaka, Uzura, Tsubame* and *Karigane*), the fourteenth torpedo flotilla (*Chidori, Kasasagi, Hayabusa* and *Manazuru*), the dispatch boat *Tatsuda* and the special service ship *Kasuga Maru* at 4 p. m. departed from Chemulpo. The first destroyer flotilla (the *Shirakumo, Asashio, Kasumi, Akatsuki*) at 7 a. m. the 21st, left Chemulpo. The above ships met on the northwest coast of Korea. A northwest wind was blowing, causing high seas, and the operation was postponed. February 22, at 4 p. m., the third division and fifth destroyer flotilla were the first to get under way, the ninth and fourteenth torpedo flotillas and the blockading fleet followed them. The first and second divisions and the fourth destroyer flotilla were the next to leave. The first destroyer flotilla and the special service ship *Kasuga Maru* departed on the 23d. The weather being fair, the blockading fleet got ahead of the schedule. By increasing the speed the first and second divisions overhauled them and on the way the first destroyer flotilla joined. At 2.40 p. m., the various units gathered at the rendezvous. At sunset of that day, with the flagships' bands playing and each ship manning the side, the blockading fleet covered by the torpedo-boat proceeded on their duty.

ENGAGEMENT OUTSIDE OF PORT ARTHUR

THE MOVEMENT OF THE MAIN FLEET

The first and third divisions, on February 23, at 5 p. m., when they became separated from the blockading fleet, were about to take up their course, received a signal from the *Fuji* stating that a ship with four stacks was seen in the northwest. Admiral Togo, changing course to northwest, ordered the *Tatsuda* to reconnoiter her, but as darkness came on nothing could be observed. Both divisions then took up the original course again and on dawn of the next day met with the *Kasuga Maru.* The third division was the vanguard. At 8.30 a. m., the first destroyer flotilla was met

with. Although Admiral Togo received a report that the blockade had been carried out, the details were lacking. Admiral Togo ordered the third division to reconnoiter the entrance of the harbor. The first division joining the torpedo craft, was ordered to search for survivors. When the fifth destroyer and the ninth and fourteenth torpedo flotillas returned, one after another, Admiral Togo ordered the *Kasuga Maru* to stand by these boats, and then proceeded to the northwest coast of Korea. From Admiral Dewa, who had reconnoitered around Port Arthur, came a message which stated the result of the blockade and the condition of the *Bayan, Novik* and the other ships. At the same time the second division and the fourth destroyer flotilla arrived, bringing to him the report. Admiral Togo, knowing that the *Bayan* and the other ships were still outside of the harbor, issued orders to the destroyer flotillas (the destroyer flotillas coming close aboard) to make a night attack on the enemy's ships. He ordered the larger ships to open a bombardment the next day. He ordered the third division to cover the destroyer flotillas until 4 p. m. and then proceed to Hai Yung Tan Island and the next day to proceed to Round Island. At noon with the first and second divisions he cruised to the southeast. The third division, which had departed for Port Arthur, arrived at a point six sea miles from Gold Hill at 9.11 a. m. After reconnoitering the enemy's condition, and the results of the blockade in detail, reported to Admiral Togo. At this time the third division observed several lines of black smoke in the vicinity of Liau-ti-chan Promontory, and found it to be the *Novik* with five destroyers returning from Pigeon Bay. Increasing speed they approached these ships and opened fire. The *Novik* at once answered. The *Bayan,* which was cruising at the entrance of the harbor, being protected by the land batteries, was engaged. The engagement lasted several minutes, but on account of a long range the firing was ineffective. The enemy escaping, and pursuit being unprofitable, the third division ceased firing and proceeded to sea.

THE ATTACK AND PATROL OF THE DESTROYER FLOTILLAS

The fourth destroyer flotilla, with orders to attack the enemy's ships outside Port Arthur at midnight of the 25th, arrived southeast of Liau-ti-chan Promontory. The second section (the *Murasame, Harusame*) separating from the first section (*Hayadori, Asagiri*) at 1.30 a. m. advanced towards the entrance of the harbor.

After a while the moon set behind Liau-ti-chan Promontory and it became dark in all directions. The searchlights of the enemy swept the sea. When the *Murasame* and the *Harusame* arrived several sea miles from the entrance in the western part of the harbor a rocket was fired and at the same time three searchlights concentrated their rays on a certain point. All the batteries and scout ships opened fire in that direction. It was evident that the enemy thought the ships that were stranded the previous night were the Japanese fleet. The *Murasame* and *Harusame* taking advantage of this drew in closer. The *Murasame* discovered the form of a ship under the batteries of Gold Hill, and at 3.03 a. m. discharged a torpedo, but did not betray her position. The *Harusame* also discharged a torpedo and retreated. The *Murasame*, conducting a second attack, discharged a torpedo at one of the scout ships. At this time it seemed as if the enemy had become aware of the presence of our ships as the firing became intense. The *Hayadori* and *Asagiri* conducted a like attack. At 6.50 p. m., the four boats were anchored on the northwest coast of Korea. The fifth destroyer flotilla, in order to attack any of the enemy's ships that might escape to Dalny Bay (being driven there by the night attack of the fourth flotilla), at 5.50 p. m. on the 24th arrived off Dalny Bay. Separating into two sections, they reconnoitered. Later, seeing several lines of smoke outside the entrance of the harbor, at 8 o'clock they discovered one of the enemy's destroyers. The first section, wishing to cut off her retreat, made a detour in order to get in the rear of her, but she was finally lost to sight. Keeping up a strict watch until midnight, they were only able to discern gun flashes in the direction of Port Arthur. Leaving the patrolling district at 2 p. m. of the 25th, they arrived on the northwest coast of Korea. The first destroyer flotilla departed at sunset and arrived at Pigeon Bay about 2 a. m. the following day. Unsuccessfully searching for the enemy, they later joined with the first division.

THE BATTLE OF THE MAIN FLEET

Admiral Togo, who carried out the third blockade of the first and second divisions, leaving Port Arthur, temporarily on the 24th of February, cruised southeast. Wishing to intimidate the enemy inside the harbor by indirect fire, on the 25th he returned to the northwest. On the way he picked up the third division and the

first destroyer flotilla, and approached the harbor entrance in single line ahead, and saw the *Bayan, Askold* and *Novik,* flying their battle-flags, cruising to the south in a like formation. He ordered the first and second divisions to break through the line. About 10 sea miles south of Vincent Cape, he discovered mines at 11.30 a. m. When the range was 18,000 meters, ordered the ships to fire as the opportunities presented. The enemy, seeing the Japanese ships advancing, attempted to enter inside the harbor, but when the Japanese ships changed course to escape the mines, the enemy came in the direction of Vincent Cape, and it seemed that they were trying to draw the Japanese ships into a disadvantageous position. The Japanese ships drew closer, and at 11.43 a. m. the *Mikasa* opened fire. The enemy's three ships and the land batteries answered. The *Asahi* and the other five ships chose their targets. Some answered the enemy's ships, some the batteries, and some carried out an indirect fire. The battle was at its height at 11.50 a. m., and shots fell everywhere. At noon the enemy's ships, one after another, entered the harbor. The first division at 19 minutes past noon retiring, lowered the battle-flag. The second division followed the first division. The *Izumo,* flagship of the second division, opened fire against the *Askold* and against the land batteries. The *Azuma* and the other ships followed her. As the enemy had now retreated inside the harbor, they were entirely lost to view, at 18 minutes past noon. The second division then bombarded the land batteries and at 25 minutes past noon ceased firing. The result of the firing was not known on account of the long range. Many shells struck in the vicinity of the enemy's ships and many entered the batteries and the harbor. It is said that a 12-inch shell exploding on the center deck of the *Askold* destroyed two guns. The stack of the *Bayan* was destroyed and the *Novik* also received damage. In the fleet the enemy had 20 men killed and 41 wounded, and on land 3 men killed and 18 wounded. The third division was ordered to watch the enemy while the first and second divisions were engaged in indirect fire. At 10.30 a. m. of the 25th, separating from the first and second divisions, cruising slowly south, and at a distance it covered the *Chiyoda* and the *Tatsuda* which were engaged in reconnaissance. The firing then commencing, they proceeded to the entrance of the harbor to watch. Discovering thin smoke rising from the seashore, they approached close to and discovered two destroyers of the enemy returning to Port Arthur.

Increasing speed they proceeded towards them. The *Chiyoda* opened fire on the leading boat. The other ships followed. The destroyers were covered by the enemy's ships at the entrance as well as the land batteries. One destroyer at full speed succeeded in making the harbor. The other boat, seeing it impossible to escape, quickly changed course and headed for Pigeon Bay. Admiral Dewa pursued but she eluded him. At 30 minutes past noon on the 3d, cruising north, suddenly came across this boat hidden in the harbor, and from a distance observed the crew leaving in the small boats. Admiral Dewa detached the *Yoshino* and ordered her to bombard the destroyer. The *Yoshino* approaching opened fire. One shell hitting under the after coming tower, flames and smoke arose. When a second shell struck the enemy the sailors who were landing threw themselves into the sea in great confusion. The third shell struck the hull, and as there was no perceptible movement of the hull it was concluded that she was aground and would be unable to escape. At 1.17 p. m. firing was ceased and they joined the main division. The third division took a course true south and at once wired the conditions to the flagship. This destroyer on the next day was blown up by her own crew.

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CAN THE GRADUATION OF THE COMPASS INTO POINTS BE DISPENSED WITH?

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Various Methods of Dividing the Compass-Card

The compass serves the purpose of enabling the navigator to know at all times where North, South, East and West are, to determine the azimuth of visible objects (compass bearings), and to turn the ship on any desired course and keep it there (navigating and steering). To meet these ends, certain partitions of the circle on the compass-card are necessary, such as will permit the azimuth-angles and the turning-angles to be measured in fractions of a complete revolution; and for this purpose various systems of dividing the compass-card have come down to us from ancient times. Still it is open to doubt whether a system which would be perfectly applicable to all purposes is desirable.

At the present time there are in common use two distinct systems of dividing the compass-card, both of them essentially opposed to each other. The mathematical division of the circle in common use is that into 360°.[2]

This division into 360° rests primarily upon the necessity of using a number having as many different divisors as possible; and in this respect the number 360 (=2.2.2.3.3.5) is unusually prolific. Of the ten lowest integers, 7 is the only one that is not a factor of 360; and in addition to this, the number 360 has 15 integer divisors higher than 10.

[1] Translated from *Marine Rundschau*, July, 1912.

[2] The division into 400° is very little practiced, and it would serve no good purpose to revive the agitation with a view to its possible application to the compass problem now under consideration.

But side by side with this graduation of the circle into degrees we find the second method of division, which proceeds from the adoption of the four points of the compass, N, E, S, W. This system is at present represented in the compass by a division of the card into units called points, which are derived by continually halving each previous division. In the first place the four principal points, N, E, S, W (cardinal points), are determined; then the intermediate points, NE, SE, SW, NW (intercardinal points), and so on, until the unit, or point, is reached. This unit, or point, is equal to $\frac{1}{32}$ of a complete turning.

But even this latter division has not been in use at all times or with all nations. This we learn from a glance at the highly interesting atlas of A. Schück.[3]

There we may see divisions of the compass-card whose fundamental interval is $\frac{1}{24}$ of the circumference (used by the Chinese, and also in Europe), or $\frac{1}{12}$ of the circumference, with the 12 principal directions indicated by appropriate names; and on one compass-card, manufactured in Glückstadt in 1787, there appears, in addition to the usual division into points and degrees, an inner circle divided into 12 intervals.

Essential Features of Point Division

At the present time the division into points is the only system appearing on our compass-cards in addition to that into degrees. The 32 points are designated as N, NbyE, NNE, NEbyN, NE, NEbyE, ENE, EbyN, E, and correspondingly in the other quadrants. The direction of the wind is seldom recorded more exactly than within one or two points; but in the case of bearing and course angles, the amount is given to $\frac{1}{8}$ of a point. So far as the divisions of the compass-card are graphically represented, we find that the points obtained from the first halvings of the circle are given the greatest prominence (the eight principal points being indicated by like signatures), while those resulting from further halvings gradually diminish in prominence. As a rule, point-division is not carried beyond the quarter-points. In Schück's atlas there is only one card (that of Plath, of Hamburg) showing eighth-points. The designation of the points of the compass

[3] A. Schück, Der Kompass. Hamburg, 1911. Selbstverlag des Verfassers.

likewise corresponds to the foregoing basic idea, so that the lesser points are invariably named with reference to the nearest superior point. Thus, N and S have a certain superiority over E and W. We say NE, not EN. Similarly, the point between N and NNE is called NbyE, never EbyN.[4]

The fundamental principle underlying point-division is based upon a fact peculiar to man's naive method of thinking and reasoning. We naturally think of "dividing" as meaning exactly the same as "halving." If a child is told to divide an apple among three persons he will first halve it, and then halve one of the halves. And even after he has realized the fact that the three portions are unequal, his further efforts to render the division more equitable will, as a rule, result only in further halvings. And man, actuated by this same principle, when asked to determine in what direction the sun appears to be in the heavens, will first ascertain it to be, say, between S and E. Then he will consider whether it be nearer to S or nearer to E; in this way he establishes the position of SE. Then he will proceed to find out if it is nearer to SE or S, and will fix SSE as a further point of departure; and so on.

ADVANTAGES OF POINT-DIVISION

The division of the compass-card into points corresponds perfectly with the above-described mental process of obtaining subdivisions by continued halvings. Its chief advantage is likewise in close relation thereto. This advantage consists in its extreme plausibility and the splendid view it gives of the system of directions. This view is rendered still more striking by means of graduated signatures, the main points looming up very conspicuously, while the auxiliary points grow less and less prominent in proportion to their relative degree of importance; all of which is requisite in practical seamanship, as, for example, steering by unstable card, or with poor light, or turning through certain desired angles, etc. To this we must add the close connection of this division with the importance which seamen attach to the tra-

[4] In naming the *minor* points, however, this rule is not invariably followed. We say, indeed, ENE½E, but not ENE½N, the latter direction being always given as NEbyE½E. As a rule, in naming the minor points, we proceed from the point nearest the North-South line, except that in each point-interval adjacent to the eight main points, we start from the respective main point.

ditional cardinal points, and to a nomenclature by which one can know at once in which quadrant, and whereabouts in that quadrant, a given direction is to be looked for. The absence of just this direct indication is what practical seamen object to in the division of the compass into degrees, particularly the graduation from 0° to 360°. To them a designation of 135° for SE, for example, does not appear sufficiently plausible.[5]

These requirements of traditional usage are doubtless justified to a certain extent; and if the division into points, which has thus far met these requirements, is to be got rid of, it can only be done by developing degree-division in such a way that it shall not be lacking in the above-mentioned advantages.

DISADVANTAGES OF POINT-DIVISION

If, now, in spite of these undoubted advantages of point-division, there is manifesting itself a movement in favor of the division into degrees and the possible abolition of point-division entirely, it is due to the fact that for a more exact indication of angular differences the principle of continued halving is extremely unsuited. The division into points aims solely at giving certain select intervals; and if we attempt to express a given angle by means of it we light upon fractions like thirty-seconds, sixty-fourths, etc. To express an angle in tenths of a degree exactly, we would be forced to give it to the 128th part of a point. How much easier it is to indicate a course with exactness by the formula N a° E, where a stands for a number between 0 and 90, than according to the principle of continued halves! As regards the manner of expressing, the simplest way would be to indicate the course merely by a number between 0 and 360. How simple the relation between two courses then becomes! It can only be a question of adding or subtracting two numbers. To one who is accustomed to think according to the halving principle, a designation like NEbyE$\frac{1}{8}$E may be sufficiently comprehensible; yet it requires, in the end, that the entire process of continued halving be followed until the meaning is fully grasped. The equally expressive designation N 66° E is much briefer, and has the advantage that this identical formula holds good for at least one whole quadrant, whereas with the designation in points, the form of

[5] Cf. "Hansa," 1911, pp. 529 and 941.

expression must be changed for each and every interval. And in the determination of change of course it is even worse. The angle contained between NbyE¾E and SE¼S is harder to indicate than the same angle as contained between 20° and 145°. But more than anything else, the ever-recurring conversions from one system of division to the other are the source of the greatest inconvenience. In the deviation-tables, for instance, it is usual to give the deviation for the ship's head in degrees. Since a point is equal to 11.25°, the conversion of compass course into magnetic course (or *vice versa*) is often amusing, the same as when one tries to total up the money contained in a wallet in which Danish kroner, half kroner and quarter kroner are mingled with German coins (the krone being equal to 1 M. 12.5 Pf.). In short, the division into points will not coalesce with that into degrees; and this divergence between the two has come to be well-nigh unbearable. Finally, the principle of continued halves is in hopeless conflict with our decimal system of notation, for the simple reason that 10 contains the factor 5 as well as the factor 2.

THE THREE THEORETICAL REQUIREMENTS FOR DIVIDING THE COMPASS-CARD

The regard for our decimal system of notation entails a third requirement, which takes equal rank with the two already mentioned. And it is just this endeavor to fill all three requirements at one and the same time, or to balance them one against another, that makes it difficult to evolve a single scheme of division that will satisfy them all. The three requirements are:

I. We desire to proceed from the greater to the lesser subdivisions by a constant succession of halvings (naive and easiest principle of division). *Example:* Graduation into points.

II. The number (A) of divisions of the circumference should contain as many different integer factors as possible. *Example:* Graduation into 360°.

III. The number (A) of divisions should conform as much as possible to the decimal system of notation, *i. e.*, it should contain the factor 10 the greatest number of times. *Example:* Graduation into 400 quasi-degrees.

The following table gives a comparison of the three graduations in the several aspects under consideration:

	Graduation into $\frac{1}{4}$-points	Graduation into 360°	Graduation into 400°
No. of divisions (A)	256	360	400
Prime factors of A	2.2.2.2.2.2.2.2.	2.2.2.3.3.5.	2.2.2.2.5.5.
Recurrence of factor 2 (Requirement I)	8	3	4
No. of different factors (Requirement II)	8	23	14
Recurrence of factor 10 (Requirement III)	0	1	2

The strong preponderance of the graduation into 360° with respect to Requirement II is noticeable at once. Considerable weight attaches also to the fact that the angles of 30°, 60°, and 120°, so useful in geometry, are integer divisors of 360°, whereas with point-division and with graduation into quasi-degrees, these angles cannot be expressed in whole numbers, for $30° = 2\frac{2}{3}$ points $= 33\frac{1}{3}$ quasi-degrees.

The question of a possible abolition of point-graduation will, therefore, eventually be determined by considering whether the advantages offered by point-division may not be derived as adequately and as satisfactorily from a mere graduation into degrees. To bring this about, we must contrive to fit a comprehensive and clear neo-point division into a degree-graduation by means of a system of graduated signatures, adhering at the same time, as much as possibe, to the principle of halving and to the customary cardinal directions; in addition to which, the new points of division must be given such appellations as will readily indicate their position in the quadrant, continuing, however, to be in harmony with degree-graduation as such, as well as with our decimal system of notation.

Former Attempts to Develop New Compass-Card Points

In the atlas of A. Schück, mentioned above, we find (Plate 29) illustrations of three compass-cards which are represented as being innovations. Fig. 2 illustrates the card of J. Bortfeldt, Bremerhaven, 1892, a description of which may be found in "Hansa," 1892, p. 205. Fig. 5 represents an experimental card of the German Navy Department, 1903, described in *Marine Rundschau*, 1903, p. 82; and Fig. 9 is a card of the U. S. Hydrographic Office, 1901, a description of which appeared on the Pilot Chart of the

North Atlantic Ocean for February, 1901. All three of these cards adopt a 10° interval as the new point-unit. On the American card this 10° interval appears straightway as $\frac{1}{9}$ of a quadrant, without any intermediate division whatsoever. In other words, the division, according to factors of 360, is carried out in the following sequence: 2.2.9.2.5, *i. e.*, after two halvings (which give us the quadrants), a further subdivision of each quadrant into nine equal parts yields the unital 10° interval, which is then divided into degrees by another halving, followed by a division into fifths. In the case of the two German cards, the quadrants are divided into thirds; the resulting 30° intervals are made prominent by means of bold signatures. The sequence of factors in these two cases is as follows: 2 2.3.3.2.5.

The main disadvantage of all three of these new-point cards lies in the fact that the intercardinal courses are not organically incorporated. And yet the need of representing these courses is tacitly recognized by all three. In the case of the German Navy Department's card, the divisions corresponding to 45°, 135°, 225° and 315° are each marked by a short line barely 2 mm. in length, the increase of which, however, is recommended in the accompanying discussion (*Marine Rundschau*, 1903, p. 218). On the Bortfeldt card the intercardinal points are shown as hair-lines, which simply do not fit into the graduation proper; while on the American card the intercardinal courses are indicated by signatures identical with those indicating the cardinal courses, resulting in the anomalous picture of a circle divided first into eight octants, with each octant subdivided into $4\frac{1}{2}$ smaller intervals.

It appears to me that this failure to incorporate the cardinal courses organically with the graduation into degrees is the reason why none of these new compass-cards has been adopted. The utterances of sundry captains in "Hansa," 1911, testify plainly to the lively opposition which may be looked for from practical seamen to any innovation which should omit such points as NE, SE, etc. "It must not be forgotten that the mariner refers to nearly all the occurrences relating to wind, weather, and navigation in terms of compass-points" (p. 529). "The navigator cannot do without the terms N, E, S, W, and desires, moreover, to see them represented in the compass" (p. 941). It is true that these statements do not urge the points that the intercardinal courses are indispensable on the compass-card; but the high esteem in which

their retention is held appears clearly enough from the articles alluded to.

The two German cards referred to above label only N, E, S and W with letters, while the American card labels only N. By way of meeting the demand that the quarters of the heaven should not be eliminated entirely, the Bortfeldt card adopts the scheme of indicating the 12 sectors of 30° each in the center of the card, labeling them NNE, NE, ENE, ESE, SE, SSE, SSW, SW, WSW, WNW, NW and NNW. This appears to me to be a very bold innovation, inasmuch as an altogether different meaning is thereby attached to hitherto well-known directions, which is very apt to result in serious mistakes. The new points proper are represented on the Bortfeldt card by the Roman numerals I to VIII, being repeated for each quadrant and starting from N and S in both directions; on the other two cards they are indicated only by increasing degree-designations from 10 to 350.

It can readily be seen, therefore, that these three cards do not meet the above-established requirements in the measure which present-day usage demands. Accordingly, the following reflections are intended to show that a more promising solution of the difficulty is to be found.

THE 15° INTERVAL AS A NEW COMPASS-UNIT, OR POINT

With the graduation into degrees we can indicate the four cardinal points N, E, S, W by multiples of 10°. The points corresponding to 0, 90, 180 and 270 degrees would then be the ones to make most prominent, and to label with the letters N, E, S, W. Up to this point we conserve the halving-principle as well as the regard for our decimal notation. The next step in point-division is to determine the intercardinal courses NE, SE, SW, NW. These also coincide with whole-numbered degrees (45°, 135°, 225°, 315°), but they are no longer multiples of 10. In other words, these degrees do not fit in with our decimal system. This forces us to decide whether the importance which is attached to the intercardinal courses is still so great as not to warrant us in permitting a degree-interval which is a multiple of 10 (the interval of 10°, in fact) to become the new point-unit, after admitting the interval of 90° as a multiple of that new point-unit, whatever it may be.

The demands of practical usage are what must decide this question. And there is no doubt in my own mind that usage will insist

upon the retaining of the points NE, SE, SW, NW, as well as the depiction on the compass-card of the interval representing a swing through four points. The importance of the angle of 45° (being one of the angles of the isosceles right triangle) in bearings is apparent; we need only refer to the bow and beam bearing. In the theory of deviation, on the intercardinal courses the quadrantal deviation D exhibits its maximum value, and the quadrantal deviation E its zero value; and it is only on these courses that equal parts of the approximate coefficients B and C make themselves felt. Observations made on the four intercardinal courses alone yield the four most important exact coefficients of deviation according to the simplest formula. Accordingly we cannot do otherwise than indicate these four degree-divisions (45°, 135°, 225°, 315°) very plainly on the degree-graduation by means of the conventional signs. Once this is done, we find that we have utilized successively, up to this point, the three factors "2" of the various prime factors of 360 (=2.2.2.3.3.5). Another division into halves would result in fractional degrees, and must therefore be left out of consideration. The only practicable division for the next step is that into thirds; whence we obtain as our new point-unit the interval of 15°.

"SWING"-DIVISION

For the time being we must use some other monosyllable than "point" to indicate this 15° interval; and inasmuch as this interval represents an angle or measure of turning, we might consider such terms as "turn," "swing," "shove," and "push." For the remainder of this article I shall use the word "swing"; perhaps usage will discover a better.

With the inauguration of this "swing"-division as a substitute for the old point-division, the uneven multiples of $22\frac{1}{2}°$ and $11\frac{1}{4}°$ would cease to figure as prominent angle-intervals. This loss, however, would not be material; for the angles in question are of very little geometric importance. In navigation the angle of $22\frac{1}{2}°$ is the only one that plays any sort of rôle as an angle of octantal deviation. On the other hand, swing-division gives us a number of new desired angles, namely, those multiples of 30° and 15° which are not divisible by 45. Such angles correspond to the maxima of sextantal deviation. But, above all, the angles of 30°, 60° and 120° figure very largely in bearing problems. Thus, $\sin 30° = \frac{1}{2}$; and 60° is the angle of the equilateral triangle. The

intervals of 15° and 30° take us back to the ancient compass-divisions which were in use prior to the introduction of point-division. Moreover, this division into 24 15°-"swings" corresponds to our 24-hour time-division; and the unit of the hour-angle is likewise 15°. Complete observations for deviation will be simplified by the use of swings instead of points, because the number of observation-courses is reduced from 32 to 24. At the same time, accuracy is not diminished. A table for computing the coefficients of deviation by observations on 24 equally-spaced courses has already been issued by the Imperial Navy Department.[6]

The change in thinking necessary for orientation on the "swing"-card, as compared with the point-card, is limited solely to the subdivisions of the 45°-intervals; since it is only in progressing from these points to the minor divisions that the continued halving-principle of the old point-division ceases. In the new card, each 45°-interval is divided into three swings. Each swing is similarly divided into three intervals of 5° each. This smallest interval is finally divided into five parts, each being equal to 1°, thus utilizing the last remaining prime factor of 360. In short, this new swing-card corresponds exactly with the sequence of the prime factors of 360 (=2.2.2.3.3.5), since we make, first, three divisions by 2, then two divisions by 3, and lastly one division by 5. The swing is reached after the fourth of the above-indicated divisions.

As regards the signatures of the individual swings, marked prominence should be given to the eight principal courses, the same as at present. The next in point of prominence would be those swings which are multiples of 15° but not divisible by 45; while the third set would consist of those multiples of 5° not divisible by 15. In the 5°-intervals, orientation would be facilitated by making the two middlemost degree-marks a little longer than the other two. However, when it comes to numbering the degrees, regard must be had for our established decimal system of notation; for, notwithstanding the fact that a swing comprises 15°, it would be purposeless to enumerate only the multiples of 15° in a linear division that extends as far as 360. In looking up a particular degree on the compass we naturally follow our established system of number-

[6] Tabelle der Produkte jedes Zehntels von 0.0 bis 50.0 mit den *Sinus* der Winkel von 15° zu 15°. Herausgegeben vom Reichs-Marine-Amt. Berlin, 1909. K. Siegismund.

ing, whereas an improvised system progressing by 15's would be extremely awkward. The line marking 71° must be found according to the usual mental process, *i. e.*, 70+1, and not by that of 60+11, or 75−4.

I am also in favor of numbering the 10's continuously from 0 to 350, instead of repeating the series 0 to 90 four times, viz., to right and left of N and S; but this has nothing to do with the present attempt to substitute swing-division for point-division. As it is, the graphic elements of swing-division conform perfectly to the before-mentioned requirement of the practical mariner, viz., that the position of a course in the quadrant shall appear plainly and directly from the method used in expressing it.

The lettering of the various quarters of the heavens, viz., N, E, S, W, NE, SE, SW, NW, should also be retained in swing-division. For the remaining 16 swings we might use expressions like N1E (to be spoken or read as "North one East"), N2E (North two East); or, if it is thought that there might be danger of being misunderstood, we could be more explicit and say "North one swing East," etc. Usage would then have to determine whether this counting should proceed by quadrants or by octants; in other words,

N, N1E, N2E, N3E (=NE), N4E, N5E, E, S5E, etc.,

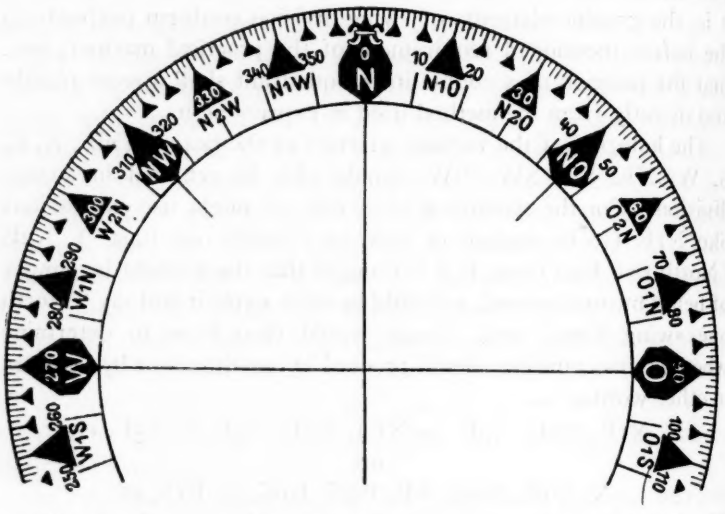
or

N, N1E, N2E, NE, E2N, E1N, E, E1S, etc.

The latter form would seem to be preferable, since the first letter invariably indicates the cardinal point nearest to the given point, and employs, moreover, only the figures 1 and 2. There can be no doubt that this designation by swings would be simpler and more readily comprehended than the present designation by points. I would also indicate the subdivisions of a swing according to the same principle, *e. g.*, N2$\frac{1}{3}$E and E1$\frac{2}{3}$N. A conversion-table from swing graduation into degree-graduation will not be needed, because it will only be necessary to increase or diminish 0, 90, 180, and 270, by 15 or 30.

The adoption of the innovation which I have thus proposed, namely, the replacing of the point-card by a combined degree- and swing-card, would entail no other possibility of confusion than that of a person who was used to the point-card being misled into using a swing-card as if it were a point-card. But for this to happen, it would be necessary that the navigator, careless of the fact that the

helmsman was steering by a swing-card, should indicate a course one point removed from a cardinal or intercardinal point. Under such circumstances the helmsman, also forgetting that he has a swing-card before him, might be supposed to steer one point, instead of one swing, from the main course, *i. e.*, $3\frac{3}{4}°$ wrong. A greater error is not likely; it would presuppose gross carelessness on the part of the helmsman.



The accompanying illustration represents a section of a degree-card arranged in the form of a swing-card. It seems to me that this arrangement displays satisfactorily not only the customary partition into quadrants and octants, but also the new division of the octant into thirds, or swings, and the trisection of each swing.[7]

The division into swings should not go further than to the third of a swing. For smaller angle-designations we would use the degree-graduation, the numbering of which is both clear and prominent.

The chief advantage of the division of the circumference of the circle into 360° consists in the possibility of using several systems

[7] Once the adoption of this new card is assured, the labeling of the intermediate swings N1E, N2E, etc., could very well be omitted, the same as we omit the labeling of NNE, NEbyN, etc., on our present-day point-cards.

of division in combination, a possibility resulting from the multitude of its divisors. In the present scheme there are essentially two such distinct systems of division which have been carried out, viz., that into 24 intervals of 15° each, and that into 36 intervals of 10° each, and yet they do not jar vitally, the one with the other, as is the case with point and degree division.

There are seamen who object to degree-graduation because the helmsman cannot follow it, and needs the guidance of point-division in order to keep his course. As far as this is concerned swing-division assumes the rôle of point-division at once. It affords clear orientation up to the third of a swing, which is a little closer than the established half-point. At the same time, swing-division does not offer the vital opposition to degree-graduation that point-division does. On the contrary, it aligns itself with degree-graduation and affords, by means of graduated signatures, a comprehensive division which adheres closely to the quarters of the heavens to which we are now accustomed.

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A SCIENTIFIC ADMINISTRATION OF THE NAVY RATION

By P. A. Paymaster D. B. Wainwright, Jr., U. S. Navy

Whether we eat to live or live to eat, our diet is of great importance to us. In infancy and old age, mistakes in nutrition are quickly apparent and prove fatal if continued any length of time. Not so, however, in middle life. Constitutions of the physically fit will then withstand long sieges of dietary error without noticeable effect. Is the harm done in such cases any the less sure because subtle? Will not a test requiring utmost endurance develop the weaknesses that normal living conditions fail to reveal?

Both mentally and physically, the strain of battle is terrific. At such a time, courage, strength and clear-headedness—all largely dependent on right living—count heavily. Our navy is organized on the principle of readiness for war. Should not the personnel be nourished with the closest regard for correct dietetic laws, so that when the moment arrives for absolute fitness, it will find no weak link in the chain of preparedness?

An efficient ration is not a negligible factor even in times of piping peace. Other things being favorable, the fact that a crew is well-fed determines the existence of a "happy ship." The hungry and dyspeptic—both products of dietary indiscretions—are notorious mischief-makers.

Granted that the subject is vital, let us examine the ration as it exists to-day, search out its defects, and weigh the remedies proposed to make it approach more nearly the ideal which animates our navy.

The ration naturally falls under two heads: the law and its administration. As to the law, Doctor Gatewood's able analysis of it and the reasons given for its enactment—*Naval Hygiene*, chapter on "The Food of the Navy"—show that it is adequate,

if not perfect, as it now stands on the statute books. Therefore our inquiry will be restricted entirely to its administration.

The principles underlying a system of administration—and efficiency depends on their close observance—are (a) central control; (b) certainty of results; (c) justice; (d) freedom within specified limits; and (e) adequate accounting.

Before going further, it is proper to state that the present system is admirable. The above principles have undoubtedly inspired those who developed it. Much has been done toward its improvement in recent years. And it is common knowledge that the food of the navy is vastly superior to that of any other service in the world. In this paper it is only expected to point out certain defects capable of elimination and to suggest that the time has arrived for another step forward.

Advance in nearly every branch of human endeavor has lately taken the course of practical application of the laws of pure science to every-day methods. The propositions here presented are three, the first of which follows this teaching. It is this: That the science of nutrition has reached a stage of development where it can be applied practically to the work of handling the ration. Computations that have hitherto seemed too complicated can be made readily available through the performance of a certain amount of preliminary work. Thus a standard could be set by which the service would be governed, and a gauge provided by which each menu could be measured and its deficiencies ascertained and remedied.

My second proposition is: That, by a modification of the present system of standard prices, greater facility could be effected in the handling of the ration, proving of decided advantage to the department and the service at large—the advantage to the department being that the cost of the ration could be easily held within a predetermined limit by adjustments made to accord with fluctuations in the prices of provisions, and the advantage to the service being that simple money values would be substituted for the complicated allowances and money values now in use, and all messes placed on the same basis.

And my third is: The adoption of a definite system of accounting aboard ship, in which each step is capable of exact verification, thus eliminating the haphazard methods employed at present.

To place the proposed changes in operation, six steps are necessary. They are as follows:

1. Establish a food-value unit. Such is required to form a basis for exact work in the next two steps, as will become apparent. Coincident with this will be the setting of a standard of nutritive value and balance, expressed in the unit adopted. This could be done by a board constituted of medical and pay officers, calling on the Department of Agriculture and other sources for the data accumulated from a long series of investigations.

2. Prepare standard recipes. Modern transportation facilities have made the articles of food comprised in the ration practically obtainable throughout the world. It would be duty of an extraordinary nature that would take a vessel where the usual provisions cannot be gotten. And even then her storerooms would contain a stock. The recipes would be prepared from ration components so as to be most palatable and still keep economy in view. Their definite composition for a given number of men, say 100, would be determined and their nutritive value established and tabulated. This should be done by a board of medical and pay officers, assisted by commissary stewards, cooks and bakers of acknowledged ability and long experience with naval conditions. It should be undertaken with the greatest pains, for on their accuracy depends the success or failure of the plan.

3. Prepare basic menus. This would be done by the assembling of a number of the standard recipes. They should be based on the navy ration and constructed with ideas of economy, variety, nutritive value and balance. Each one would cover a week, and there should be enough to provide for possible contingencies of duty, climate and seasons. Their nutritive values and the quantities of provisions required for their issue to the men should be tabulated. Again this work should be performed by a board of medical and pay officers, assisted by commissary stewards, cooks and bakers with proper qualifications.

4. Establish standard prices. These would vary from the present prices by going into greater detail and being brought up to date. Now the unit price is for a ration of bread, meat, vegetables, etc., but the new prices would be for each article of food and the unit that of commerce—pounds, gallons, etc. At present the allowance price for a quantity of veal is exactly that for the same quantity of beef, yet the actual market quotations often differ widely. This is true of many other articles. Placing a value on each article of food is not so involved as might be thought. There

are 99 items of clothing priced each year, whereas the articles of food now designated as ration components number only 96. Of course there are many articles classed as " miscellaneous," but this proposal does not contemplate a change in their status or the conditions of their issue. But having the comparatively expensive articles assessed at a standard value in true relation to their cost, would check their thoughtless issue and be more in accord with the latest amendment to the ration law. A board of pay officers and the chief of the division of provisions should make the calculations. They should be guided by past experience, the probable trend of prices, and the probable distribution of our naval forces in the near future.

5. Establish a ration allowance. This would be expressed in money value and be determined from the basic menus. It would represent the cost per man per day at standard prices of such menus, which had been designed with a view to uniformity of expense. No great departure from present practice is contemplated, as the total of present allowance values has a definite equivalent in money. The principle underlying the Statement of Over and Under Issues is very simple, but the application is so roundabout that this fact has been lost to view. A money allowance should also be made for issues to the steaming watch. The same personnel should constitute the board as in the case of standard prices.

6. Devise an accounting system. This could be done by the same board as for the last two steps.

Having announced the procedure for inaugurating the system, let us now consider its effect when judged by the principles above enumerated.

Central Control.—The guiding stars of such control are, and ever should be, economy and efficiency. Everyone having the interests of the service at heart must be in thorough sympathy with these aims. Economy has a much broader interpretation than the mere saving of dollars and cents. For what does money represent but the measure of human effort? If that effort can be saved from needless waste, to what noble purpose might it not be applied? Economy is then legitimately served in keeping down the cost of the ration. But are the methods at present employed what they should be?

The modern idea in management is leadership as opposed to the antiquated one of driving. The department has insisted on a low

cost for the ration, but has it offered any suggestions as to the course to be adopted? Would not the basic menus be concrete examples as to how economy might be attained, and within the department's own set limit? This would be the method of modern management, and would go a long way toward eliminating that foe of economy—waste.

Should the demand for economy become more imperative, the menus could be revised by the substitution of cheaper, if not so desirable, dishes. Still there would be no difficulty for the service to follow the department's wishes, when the way is demonstrated and actual figures given. Thus the central control of the cost of the ration would be complete without taking the form of repression.

Also the means of more closely estimating the future cost of the ration would be available.

Efficiency, as pointed out, should include considerations of dietetic value and balance of the ration. How does the present system place a check on utter disregard of them? How many of those who conduct the general messes aboard our ships have even the vaguest conception of their meaning? For this the new system furnishes an automatic remedy in the weekly Menu and Dietetic Statement later described.

Certainty of Results.—The present system provides a method by which an accurate record can be kept of amounts of provisions issued for consumption from day to day (Daily Ration Record). But when a menu is prepared, is there any way of estimating what provisions will be required to serve it? or, but by the merest guesswork, to tell what it will cost? This is absolutely provided for by the basic menus and standard recipes.

When a vessel is provisioned for a long cruise, is there any way now of telling just what stores will be left on hand at the end of any given period? or whether there is not a preponderance of some items over others just as necessary? But select the basic menus to be followed on the trip, and all the necessary data will be easily obtainable from the tabulations.

All computations of the standing of the general mess at present involve complicated and extensive calculations of *past* issues. How many pay officers have the time to spare from their many duties to make such calculations at any but infrequent intervals? Are they not more or less at the mercy of a subordinate whose lack of proper schooling in many cases has made mathematics for him

a most inexact science? One often wonders if the mark given by a commanding officer on the report of fitness of a commissary officer is not more accurately a gauge of the efficiency of the commissary steward. Many an over issue in the past has been due to ill-placed confidence. All this would be changed by the new system. The commissary officer would have at his disposal exact quantities and costs, and, as explained under accounting, a simple method of keeping posted on the standing of the mess, which will show not only past but *future* issues.

In the preparation of the various dishes of the menu at the galley, does not their composition vary to a surprising degree from one ship to another? The alteration of a few ingredients can easily change what is a favorite dish on one ship to a despised one on another. Would not the standard recipes correct this?

Frequently a crew is augmented by the arrival on board of a draft of men. In the preparation of a larger amount of a dish to provide for the additional hungry mouths, is a true proportion kept between its constituents, or an exact relation maintained between the amount of the cooked dish as it then is and as it would have been had no draft arrived? Is there no more water in the soup? The rough and ready methods now employed in estimating the quantities required for issue, seem beyond doubt the most fruitful source of waste. But substitute the tested data of the standard recipes, and a great step will be made toward the goal of economy.

Justice.—In the absence of definite knowledge of food values, has not the low cost of the ration been maintained in many cases by curtailment of the allowances? Duty often takes a ship to little-frequented ports where prices of provisions soar. She must keep within the cost assigned more fortunate ships stationed where food is much lower. Is not their fare more abundant in consequence? Why should her crew suffer? Is it fair to the enlisted man? The proposed scheme places all ships on the same basis. The standard prices will be based on the probable cost of each article for the service as a whole. As shown under accounting, local prices will be disregarded in the computation of standing. Is not that as it should be? Was not the ration law enacted to apply to all equally?

One effect of the basic menus will be the standardization of the food aboard all ships. There will be no excuse for poorly fed crews.

Freedom.—At present there is the utmost freedom in the selection of articles of food as comprised in the ration and of the interchange of those articles at a value determined. Nor will the proposed system curtail this freedom in the main. It is generally conceded that a diet cannot be too varied as long as it has the proper nutritive value. But, in the absence of general knowledge of such values, have they not been disregarded many times?

It is not proposed to make the basic menus compulsory. They are intended only as a guide. But with the wealth of data they will furnish, it is thought that the line of least resistance will lead to their adoption in nearly every case. However, any combination of the standard recipes may be made that comes within the allowance and measures up to the standard of nutrition and balance. To provide for such departures from the basic menus, the weekly menu will be expanded so as to include a dietetic statement. For the sake of standardization among the ships, recipes believed superior to the standard will have to be submitted to the department for test and adoption before their use can be authorized.

There has been one proposal advanced by an authorized board to the effect that the articles of the ration be reduced in number and restricted to those obtainable in time of actual war. This proposition is at variance with the dietetic law of variety. Why cross a bridge until we come to it? The diet can be accommodated overnight to any exigencies of supply. Are there not tales of lost arctic expeditions subsisting on the leather of their shoes? But who ever seriously entertained the opinion that shoes should be made the staple food of any expedition? It is granted that it might be well to prepare a basic menu to cover such conditions as war will present, and for those charged with supply at such a time to keep a weather eye open on the sources from which may be obtained large quantities of a predetermined and restricted list of provisions.

Accounting.—To accord with the principles of modern management, it is recommended that a standard system of accounting for the general mess be adopted, and records and blanks of an approved design be furnished, as in the case of other accounts. The following records are suggested as answering the requirements of the above proposals:

(a) Provision Ledger—continual: There is no such record in general use at present, but it is in line with the best practice in business and would be equivalent to the Stock Ledger in the general

storekeeper's department. Its use would supersede that of a rough provision return and it would give more detailed information. There should be a totals-of-vouchers sheet and a sheet for each article of provisions. All receipts are debited and all issues credited. Each voucher from a general storekeeper or another pay officer is entered as received. Totals of receipts of fresh provisions are entered at the end of the month or upon leaving port, from the Purchase Record next described. Expenditures are made upon transfer to another pay officer or upon issue from the storeroom or cold storage to the commissary steward. Fresh provisions that are delivered direct to the commissary steward are expended when the debit entry is made. Each sheet is balanced at the end of the quarter by crediting the inventory of the storerooms and cold storage and immediately carrying down the inventory as the first debit to the next quarter. A column in which is entered the balance on hand after each issue, will show the quantities of provisions remaining in store and will prove a valuable aid in placing orders for fresh stock before items become exhausted.

The entries may be used for verifying dealers' bills and, if a check mark is placed opposite each item as it appears correctly on a bill, a glance through the ledger will disclose outstanding indebtedness.

(b) Purchase Record—continual: This is formed by filing in a loose-leaf binder, for convenience, the reports of the officer of the deck as to provisions received from dealers. The reports may be arranged so as to bring together those showing receipts from one dealer, and a summary sheet added. At the end of the month or stay in port, receipts for each article are totaled and posted to the Provision Ledger.

(c) Issue Ledger—continual: This record is an expansion of the present Daily Ration Record so as to show more detailed information. It contains a page for each article of provisions. The debits are composed of all receipts by the commissary steward from the storerooms and cold storage, and from dealers, in the case of fresh provisions delivered directly into his charge. The expenditures are all issues of provisions for whatever purpose. There should be sufficient columns to show exactly what disposition has been made of every ounce of provisions received by the commissary steward.

(d) Sales Record—continual: This will mean the adoption of a standard form to cover the present practice of recording each sale to a mess on a clothing receipt and, after being signed by the mess's representative, furnishing a carbon copy.

(e) Survey Record—continual: A standard form should be devised for the record of all provisions surveyed as unfit for issue.

(f) Inventory Record—continual: There should be a permanent record of all inventories.

(g) Ration Notice—daily: This form is now in use.

(h) Steaming Watch Notice—daily: This is a report from the senior engineer officer as to the number of men requiring the steaming ration.

(i) Issue Statement—daily: This is an order signed by the commissary officer to the commissary steward, covering the issues of provisions to the crew for one day. It is an analysis of the menu for that day and shows the exact quantity of each article of food to be issued for the number of men to be fed. It is prepared several days in advance and thus forms a guide as to the amounts of fresh and dry provisions to be required and permits their timely procurement. Moreover, it is an exact *forecast* of the cost of the ration.

(j) Provisions Issue Order—daily: This is an order signed by the commissary officer on the storeman to issue to the commissary steward provisions required by him from the storerooms and cold storage. Success has attended the placing of these storerooms under a storeman independent of the commissary steward. The form prevents the use of provisions without a record of their expenditure being made.

(k) Dealer's Order and Delivery Form—daily: A written order on a dealer for the delivery of provisions is now required. This is the same form so arranged that the carbon copy is used by the officer of the deck in reporting the quantities received. This copy then goes to the Purchase Record.

(l) Menu and Dietetic Statement—weekly: This is simply an expansion of the present weekly menu so as to include a statement showing the nutritive value and balance of that particular menu. It is recommended that a place be left on it expressly for the signature of the medical officer of the ship, showing that he has examined it and found it satisfactory. The use of this statement will relieve the department of any concern as to the quantities of provi-

sions issued, and the audit of returns will be simplified by dealing with values only.

(m) Ration Voucher—monthly: Now in use.

(n) Steaming Watch Voucher—monthly: Devised as a summary of the daily notices and as a supporting voucher for the return.

(o) Public Bill—monthly: This form would be like that now in use except that it would have parallel vertical columns, showing the extensions and totals of the articles in both cost and standard prices. By the addition of this column, the same information as to the standing of the mess is provided as in the Over and Under Issue Statement, but in a much simpler and more direct way, involving fewer arithmetical operations and therefore fewer chances for error.

(p) Expenditure—monthly: Designed like Public Bill to show cost and standard prices.

(q) Sales to Messes—monthly: Designed like Public Bill to show cost and standard prices.

(r) Accounting Sheet—monthly: This is a new form intended to keep a constant check on the cost of the mess and its standing at any time. It is ruled horizontally, a line for each day in the month, and divided vertically into three parts, viz., debits, credits and standing. All entries are made at standard prices. Issues from the storerooms and cold storage are debited as made. Fresh provisions received are debited daily. These form all the charges against the mess. Credits are made of sales and surveys, and there is a column for the crediting of an inventory of provisions in the issue room and at the galley, made on any day designated. The debits minus the credits give the actual issues to the crew, and this amount is entered under standing. To form a proper idea of the efficiency with which the mess is being conducted, each day there is entered under standing, the ration allowance, the steaming allowance, and the estimated cost of the menu from the Issue Statement. All these items are carried through the month with cumulative totals, and a comparison of the actual issues with the total allowances to date, as well as the estimated cost to date, gives an exact idea of how well the Issue Statement is being carried out by the commissary steward.

(s) Balance Sheet—quarterly: With the present system, the accounting to the department is done upon the Provision Return

and the Statement of Over and Under Issues. They both combine the features of a partly detailed statement and a balance sheet. The suggestion is to combine and simplify them, making but one balance sheet. On this new balance sheet will be ruled parallel vertical columns which will contain, in one, the information now on the Provision Return and, in the other, that shown on the Statement of Over and Under Issues. Only voucher totals will appear, and all detailed information will be confined to the vouchers themselves. This will make the return easier to prepare and its significance easier to grasp afterwards. The details will still be available, if they are required, and the idea is to require them for the Cost and Standard Price Record, described later.

The debits and credits will be recorded in both cost and standard prices in the appropriate columns. The debits are the inventory brought forward, receipts from all sources, and, in the standard price column, a possible over issue. The credits will be, in the cost price column, sales, survey, transfers, inventory carried forward, and actual cost of subsistence; and, in the standard price column, total allowances for the number of men rationed, steaming ration allowances, sales, survey, transfers, inventory carried forward, and any under issue.

Several cumbersome steps will be avoided by the adoption of a single balance sheet. There will be no computation of average prices, which serve no useful purpose but to balance the return, and are the constant lurking-places of arithmetical error. There will be no transfer from the Provision Return of commercial weights and measures, appearing on the Statement of Over and Under Issues as ration allowances, with all the complicated computations in between. And yet the same vital information will be given regarding receipts of provisions to be accounted for and the conduct of the mess within the allowances.

It is believed that the principles underlying the new balance sheet will be so easily understood that its use could be extended to those vessels that do not carry a pay officer, thus further standardizing the ration.

(t) Survey—quarterly: Designed like Public Bill to show cost and standard prices.

(u) Cost and Standard Price Record—continual: In addition to the above records, there should be maintained in the department a record book with a page for each article of provisions. As each

ship's balance sheet is audited and found correct, the invoices and public bills will be posted, item by item, in this book, giving the cost and standard prices of all provisions. This record would be of the greatest assistance in determining at any time what the ration was actually costing as compared with the estimates. And also it would give valuable information in assigning the standard prices for the next year.

These records, altogether, form a system of accounting that is different in many respects from the one now employed. It bridges over chasms of uncertainty and chops away the deadwood of unnecessary detail. To summarize; The Provision Ledger is an innovation, but is required by ordinary business sense. The Issue Record is not new, as it only gives a more accurate record than the present Daily Ration Record. Its details will locate the leak exactly in case of an over issue. The Issue Statement is new and requires but a few minutes to prepare with the data given by the basic menus and standard recipes. And then it is a direct order in black and white as to what must be done according to the best practice. If it is not followed, it would soon become apparent and disobedience of orders could then be dealt with. The Menu and Dietetic Statement is practically new. It can be prepared in a few minutes if a basic menu is adopted; if not, the tables with the standard recipes would give the data in a very short time. Its use would place the ration on a scientific basis. The Accounting Sheet is also new. It requires only a few minutes a day to keep it posted, and then its use banishes uncertainty from commissary work. Lastly, the Balance Sheet is simply a modification of the present returns. Its extreme simplicity and direct methods are matched by the ease with which it can be audited.

All the above may occupy daily a few more minutes of the commissary officer, but the justice of the standard prices, the certainty and facility they will substitute for the present primitive methods, the authority of the standard recipes, and the possibilities of economy promised by their use and that of basic menus—elimination of waste—and the sure grip given the department on the control of the ration by the proposed system will appeal, it is hoped, to those who have long looked for a scientific administration of the navy ration.

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THE SUMMER CRUISE FOR MIDSHIPMEN OF THE SECOND CLASS

By Lieutenant James O. Richardson, U. S. Navy

The plan of sending midshipmen of the first and second class to sea on board the battleships of the fleet during the summer months has now been tried for two summers, and opinion in the fleet should be fairly well crystallized as to the merits of this plan and as to whether it is superior to the old plan of having the Midshipmen make the summer cruise in a few selected ships forming a special training squadron.

It is believed that the new plan is far superior to the old one.

The disadvantages of the new plan are: (1) The difficulty of adjusting the marks and reports from the various ships so that they will form a fair basis for arranging the standing of the midshipmen for the cruise; (2) the relaxation of restraint and the tendency to break down Naval Academy discipline, due to the change in the methods of administration, greater freedom of action, and reduced surveillance; (3) the loss of time by the fleet in making two visits to Annapolis; (4) the increased demand upon the time of the officers in the fleet during a period of great activity; (5) the division of responsibility for the instruction and training of the midshipmen between officers of the fleet and midshipmen officers.

The difficulty of adjusting the marks and reports from the various ships cannot be completely overcome, but the marks can be so changed that the leading midshipman on every ship will have the same mark, and the weight given these for the summer cruise can be so reduced as to practically eliminate the effect of any unfairness.

The relaxation of restraint and the reduction of surveillance are not altogether defects of the new plan, for many officers are of the opinion that after eight months of Naval Academy life the midshipmen are benefited by some relaxation, and that after such a summer they are more amenable to discipline during the year following.

The loss of time by the fleet in making two visits to Annapolis could be obviated by transporting the midshipmen to and from Hampton Roads in some auxiliary, but one visit of the fleet to Annapolis more than compensates for the loss of time, by keeping the officers of the fleet in touch with, and renewing their interest in, the Naval Academy.

The increased demand upon the time of the officers of the fleet is only a potential disadvantage, because during the past two years officers of the fleet have devoted so little time to the midshipmen that they have not felt any increased demand upon their time; but even if the operation of this plan were so changed as to cause officers, through interest, to join in the instruction of the midshipmen, the additional time would be given freely and would not interfere with the regular duties of officers.

The division of responsibility for the instruction and training of midshipmen is the one real fault of the new plan as it has been in operation during the past two cruises, but it is not an inherent defect of the plan itself, but has existed in the past through the lack of any definite order as to duties and responsibilities of the officers of the fleet in regard to the instruction of the midshipmen.

All officers are directed to assist in the endeavor to develop in the midshipmen a proper officer-like character, and instruct them carefully in their various duties; but no officer is charged with any definite duty, and the result is generally that the midshipmen receive little instruction from officers in the fleet, and the instruction of the two classes in the various prescribed subjects is more than can be done by the midshipmen officer.

The advantages of the new plan are: (1) The experience on board a modern ship in the active fleet; (2) the opportunity for more personal and individual instruction; (3) the change in the mental attitude of many of the midshipmen in regard to studies; (4) the absorption of the spirit and ideals of the service through closer contact with the officers and the men of the fleet.

Under the old plan the midshipmen cruised in midshipmen

practice ships under special temporary conditions that in no way resembled the conditions on board one of the ships of the fleet, and their experience could not give them any but false ideas as to their future life and duties on board ship. They were really living under the Naval Academy system modified to fit in with life on board ship, and under conditions that were created especially for them and were highly artificial.

The opportunity for more personal and individual instruction is afforded by the division of the midshipmen into small groups where there is available for instructors at least one officer for every four midshipmen, whereas, under the old plan, there were available as instructors a limited number of officers and in actual practice there were often only three instructors in some subjects for all of one class.

The change in the mental attitude of the midshipmen toward study is due to the fact that under the new plan the midshipman sees the practical application of the principles studied at the Academy, and the value of knowledge of professional subjects that form the larger part of the Academy course. He forms a part of the ship's organization and very soon takes a pride in knowing as much as he can learn about his particular station, and studies just to know and use what he learns rather than to make a mark of two-five or better. The mark, as an object of study, practically disappears and its place as the incentive to study is taken by the desire to know about things that must be used on board ship.

The midshipmen at the Academy know that the Naval Academy exists for the midshipmen, that they are the important part of the institution, that they are always under consideration, and that everything is planned for them. They also often feel that discipline is unnecessarily severe and that their officers and instructors are unsympathetic superiors. A class feeling grows up that tends to bind the midshipmen together and separate them from the officers as from a different class, and array one against the other. It is the feeling of the governed class against the governing class. These same conditions existed on board the practice ships under the old plan, and consequently the midshipman never had a chance to change his point of view or live under any other influence than the old spirit and ideals of the brigade.

Under the new plan the brigade is broken up and the midshipmen form a part of the ship's company, and they see that the fleet is the

real essence of the navy and that their presence in no way changes the work of the fleet. They see the necessity of order and discipline and see that they are not the only persons who are subject to regulations and orders. They learn that officers are not a superior class, but are really older brothers or grown-up midshipmen who understand them and are willing to help them. They soon learn that the true measure of every thought and deed should be, "Is it for the good of the service?" and that what the navy needs and expects of them is that each one will so live that all may see that he is imbued with the spirit of the service, "I must make good."

Unquestionably the advantages of the new plan far outweigh the disadvantages, and it is believed that the new plan can be so improved in operation as to make the next summer cruise result in more good for the midshipmen and the service than any previous cruise.

The work of the second class on the *Delaware* will be shown, as that is the only work with which the writer is perfectly familiar.

When the midshipmen came on board at Annapolis, the following schedule of stations, duties, and note book subjects was posted:

1. The number after the names of the midshipmen shows the note book subject for that week.

2. The midshipman whose name is followed by "8" will be considered the senior second classman for that week. If at anchor, he is to be in the engineer's office during the day; while under way, he stands watch in the engine room. On Saturday morning he will collect all note books and deliver them to the officer in charge of midshipmen.

3. The midshipmen stationed in the engine rooms and fire rooms will stand watch in three under way; the first three men in the engine room will stand watch in the starboard engine room; the last two men in the engine room and the first man in the fire rooms will stand watch in the port engine room; the last three men in the fire rooms will stand watch in the fire rooms. The watch will start when fires are lighted preparatory to getting under way, and end when boilers and engines are secured after anchoring.

4. On odd-numbered days the midshipmen of the first and third sections will be the duty section, and those of the second and fourth sections will be the relief section, and vice versa on even-numbered days.

5. At anchor, all midshipmen of the duty section will remain on their stations during working hours, observing the work in progress and collecting data for their note books, and only the relief section will be present at quarters.

6. Midshipmen of the relief section are entitled to liberty when in port.

7. The stations for the week change at 8 a. m., Sunday morning.

NOTE BOOK SUBJECTS FOR SECOND CLASS

1. Compartment drainage, fire-main and flushing systems.
2. Main and auxiliary steam and exhaust lines, including their drainage.
3. Auxiliaries in fire rooms, forced draft system, bunker ventilation, lighting, etc., feed water heating system, and grease extractor.
4. Boilers, including their attachments and fittings.
5. Main engines, water service, oiling system, etc.
6. Auxiliaries in engine rooms.
7. Auxiliaries outside engine rooms and fire rooms proper.
8. Organization, general storekeeping system, and engineer's office work.
9. Rudimentary description of the electric plant for furnishing light and power.
10. Rudimentary description of the electrical systems of interior communication.
11. Elementary wiring of the set on board and the names and functions of the different parts of the radio set.

STATION BILL

Name	Hammock No.	Locker No.	Section	Abandon Ship	General Drills
Peck, De W.....	11	11	1	1 S. L. 1st C.	
Pennoyer, F. W.....	12	12	1	1 S. L. 1st C.	GO
Perry, B. F.....	13	13	1	1 S. L. 2d C.	
Peyton, P. G.....	14	14	1	1 S. L. 2d C.	TO
Pigman, N. H.....	15	15	2	2 S. L. 1st C.	STATION
Pike, W. H. A.....	16	16	2	2 S. L. 2d C.	
Portz, W. P.....	17	17	2	2 S. L. 2d C.	
Powers, M. W.....	18	18	3	3 S. L. 1st C.	FOR
Preas, R. A.....	19	19	3	3 S. L. 2d C.	
Preston, K.....	20	20	3	3 S. L. 2d C.	WEEK
Quynn, A. G.....	21	21	4	4 S. L. 1st C.	
Ray, J. S.....	22	22	4	4 S. L. 1st C.	
Rhae, P. M.....	23	23	4	4 S. L. 2d C.	
Richards, F. G.....	24		4	4 S. L. 2d C.	

Week ending	Engine Room		Fire Room		Auxiliaries		Dynamo Room		Radio	
June 14	Peck	8	Pike	2	Preston	7	Quynn	9	Richards	11
	Pennoyer	1	Portz	2			Ray	9		
	Perry	1	Powers	2			Rhae	9		
	Peyton	1	Preas	2						
	Pigman	1								
June 21	Richards	8	Pigman	2	Preas	7	Preston	9	Rhae	11
	Peck	1	Pike	3			Quynn	10		
	Pennoyer	5	Portz	3			Ray	10		
	Perry	5	Powers	3						
	Peyton	5								
June 28	Rhae	8	Peyton	2	Powers	7	Preas	9	Ray	11
	Richards	1	Pigman	3			Preston	10	Quynn	11
	Peck	5	Pike	4						
	Pennoyer	6	Portz	4						
	Perry	6								
July 5	Quynn	8	Perry	2	Pike	7	Powers	9	Preston	11
	Ray	8	Peyton	3	Portz	7	Preas	10		
	Richards	5	Pigman	4						
	Rhae	1								
	Peck	6								
	Pennoyer	6								
July 12	Preston	8	Peck	2	Pigman	7	Pike	9	Preas	11
	Quynn	1	Pennoyer	2			Portz	9		
	Ray	1	Perry	3			Powers	10		
	Rhae	5	Peyton	4						
	Richards	6								
July 19	Preas	8	Richards	2	Peyton	7	Pigman	9	Powers	11
	Preston	1	Peck	3			Pike	10		
	Quynn	5	Pennoyer	3			Portz	10		
	Ray	5	Perry	4						
	Rhae	6								
July 26	Powers	8	Rhae	2	Perry	7	Peyton	9	Portz	11
	Preas	1	Richards	3			Pigman	10	Pike	11
	Preston	5	Peck	4						
	Quynn	6	Pennoyer	4						
	Ray	6								
August 2	Pike	8	Quynn	2	Peck	7	Perry	9	Pigman	11
	Portz	8	Ray	2	Pennoyer	7	Peyton	10		
	Powers	1	Rhae	3						
	Preas	5	Richards	4						
	Preston	6								
August 9	Pigman	8	Preston	2	Richards	7	Peck	9	Peyton	11
	Pike	1	Quynn	3			Pennoyer	9		
	Portz	1	Ray	3			Perry	10		
	Powers	5	Rhae	4						
	Preas	6								
Aug'st 16	Peyton	8	Preas	3	Rhae	7	Richards	9	Perry	11
	Pigman	8	Preston	3			Peck	10	Pennoyer	11
	Pike	5	Quynn	4						
	Portz	5	Ray	4						
	Powers	6								
Aug'st 23	Perry	8	Powers	4	Ray	7	Rhae	10	Peck	11
	Peyton	1	Preas	4	Quynn	7	Richards	10		
	Pigman	5	Preston	4			Pennoyer	10		
	Pike	6								
	Portz	6								

Paragraph 3 of the order was based upon the Navy Department's "General Instructions for Midshipmen's Summer Cruise," but after about one week the midshipmen standing watch were excused from watches between 10 p. m. and 6 a. m., for it was found that a strict watch in three was too much for such young men and that they were so sleepy that they could learn nothing.

The note book subjects are those assigned by the Navy Department.

The schedule of weekly assignments is made so as to carry out the provisions of the Navy Department's instructions.

The midshipmen officer and the senior engineer officer talked over the work of the midshipmen and it was agreed that the senior engineer officer should have charge of the instruction of the midshipmen in engineering, the radio officer in radio, and that the midshipmen officer would mark all note books and give the required instruction in seamanship, ordnance, and navigation.

On the first Monday morning, the second class midshipmen were assembled and the system for the cruise was explained as follows:

In order that there can be no misunderstanding during the three months that we are to be together, I will explain the system under which we are to work. The order and schedule shows where you are stationed, what you are to do, and what subjects you are to write up in your note books. In addition to this you are expected to learn as much as you can about the Engineer Department.

You will be given lectures on boilers, engines, boiler water testing and fuel oil testing, and the iron foundry and the machine shop at the New York Navy Yard. You are urged to ask as many questions as you like, and all officers and petty officers will be glad to answer any questions, or give you any assistance possible. It is much easier to ask questions of enlisted men now than it will be later when you are commissioned officers, so make the most of your opportunities and find out now.

You will be examined orally once a week and you will have written examinations from time to time to see what progress you are making, but remember that the marks assigned are of little importance compared with what you learn, and I had rather you would learn one thing just because you wanted to know why, than many things just to make a good mark.

By department order you are not allowed to smoke, and I hope that none of you do; but if you do violate this order, I want you to understand that it must not be done in the engine rooms or fire rooms, because there you would be injuring the ship and me by disobeying an order in the presence of enlisted men, setting them a bad example, and causing them to lose their respect for you and for the ship's orders and regulations.

You understand that the officers of the Engineer Department are by no order or regulation charged with the responsibility for your instruction,

but we are ready and willing to help you and it rests entirely with you whether or not you learn anything during the summer or make the best of your opportunities.

The petty officers were assembled and addressed as follows:

The midshipmen are on board ship to learn as much as possible, and it is up to you to answer all the questions asked and explain anything you can. With the brigade of midshipmen, the *Delaware* now has the reputation of being the best ship in the fleet for one who wishes to learn something of engineering, and I expect you to help in proving that this is true and that the *Delaware* is worthy in every way of her excellent reputation.

The summer work was carried out as outlined in the talk to the midshipmen. Officers and warrant officers of the Engineer Department took the midshipmen in hand, traced out steam lines, feed water lines, drainage and salt water systems, with them, explained and named the principal parts of boilers and engines, lectured on and demonstrated the testing of boiler water and fuel oil. At the New York Navy Yard the midshipmen were taken through the machine shop, where the different machines were named and explained to them, and through the foundry and copper shop, where the leading men very willingly showed them around and answered any questions.

The senior engineer officer or the senior assistant held the weekly oral examinations, and both of them looked over the monthly written examinations.

Midshipmen were not encouraged to study books because it is believed that they have enough of that at the Naval Academy, but they were shown drawings and tracings of the details and general arrangement of the boilers and machinery on this ship.

Buzzers were fitted up, and all midshipmen learned the International Morse Code so that every one could receive at the rate of about nine words per minute.

All instruction, except in engineering and radio, was carried out by the midshipmen officer, so that all instruction fitted in without interference or disagreement.

At the end of the summer the midshipmen were all satisfied that they had been greatly benefited by the summer's work, and the best proof that they had learned something of engineering is the following final examination:

FINAL EXAMINATION

TIME: 2 HOURS 30 MINUTES

1. Make a rough sketch of a main condenser, showing the course of vapor, feed water, and sea water.

2. Sketch an indicator card and indicate and name the different points and lines.

3. Trace the course of steam from the boiler through engines and back to boiler, naming valves, fittings, parts of engine, tanks, pumps, etc., through which it passes.

4. What is the use of the independent linking-up gear on the main engines, and what does it mean when one says, "The I. P. link is set at 66"?

5. You are on watch in the engine room, ship at anchor. At 5 a. m. you receive orders to get under way at 8 a. m. State your preparations for getting under way.

6. Name the valves and external fittings on a boiler.

7. You are on watch; steam on boilers 7 and 8 for auxiliary purposes. No preparations having been made, at 5 a. m. watch comes on for boilers 1, 2, 3, and 4. To get under way at 8 a. m., give procedure in fire rooms.

8. Make a rough sketch of an evaporator showing the fittings. Show by line sketches and arrows showing flow of vapor, two evaporators working in double effect.

9. Describe the action of an Allen Dense Air Ice Machine. Tell how it works.

10. Write the Continental Morse Code.

11. Describe the radio outfit on board. Make a diagrammatic sketch of the sending and receiving circuits.

12. Describe a generator and the driving unit.

Before coming on board for the summer's work, the midshipmen had had very little instruction in engineering, yet on this examination the average mark was 3.04 and the best mark was 3.70.

It is believed that the new plan of sending midshipmen of the first and second class to sea in the battleships of the fleet should be adopted as permanent, but its operation should be improved by the formulation and printing at the Naval Academy of a schedule of stations, an order, and a list of note book subjects, and by fixing the responsibility for the instruction of midshipmen.

In order that every midshipman may have an equal chance, it is necessary that all of them spend the summer under nearly similar conditions, working under the same general plan for their instruction, and it therefore follows that this plan for the instruction of midshipmen should emanate from the Naval Academy and that it should be sufficiently clear and concise to ensure its being understood and put into operation in the same way on all the ships of the fleet.

The schedule of stations, the order, and a list of note book subjects similar to the ones used on the *Delaware* are recommended because they form a plan for the handling of the second class that is sufficient to ensure an opportunity for every midshipman to become acquainted with every station of the Engineer Department, and it is a plan that will run the instruction of the midshipmen fairly well, even if they are completely neglected by the ship's officers; yet it is not so definite or restrictive as to limit or hinder in any way the efforts of the ship's officers to teach the midshipmen.

The " Schedule for Instruction of Midshipmen " and the " General Instructions for Midshipmen's Summer Cruise " should be broad enough to cover the whole subject thoroughly, sufficiently definite to ensure the adoption of a sound plan for the instruction and handling of the midshipmen. But they should not be made out in such detail as to attempt to cover every possible condition and every working hour of the midshipmen's summer, for if this is done the officers in the fleet will feel that their help is not needed and that their whole duty is done when the Naval Academy plans are posted and made known to the midshipmen, whereas what is needed is the co-operation of every officer in the fleet.

The new plan has never been given a fair trial in the fleet because no one ship's officer has ever been charged with any definite responsibility for the instruction of the midshipmen, and the result is that many officers feel that they are not expected to participate in any way in the instruction of the midshipmen.

One senior engineer officer, when asked what he was doing for the midshipmen, replied, " Nothing except that I try not to step on them." This was the attitude of an excellent officer and an efficient engineer, and it is believed that it is the attitude of many officers in the fleet, simply because no order definitely states that the . . . division officer shall be responsible for the instruction of the midshipmen in . . . .

It is recommended that the senior assistant engineer officer be relieved from watch-standing during the summer and be given the additional duty of instructor of the second class in engineering. On many battleships there are warrant officers who do not stand watch but who are qualified to do so, and the senior assistant engineer officer could easily be relieved from watch-standing, in order that he might thus do the service more good by instructing the midshipmen.

Last summer the commanding officer and the midshipmen officer were given particular duties in relation to midshipmen, but the duty of all other officers was to " assist in the endeavor to develop in the midshipmen a proper officer-like character, and instruct them carefully in their various duties," and this duty was apparently done in most cases by the example set and by a few words of advice from time to time.

It is believed that every division officer should be definitely charged with the responsibility for some part in the instruction of midshipmen; and if this is done, it is believed that all officers will gladly do their share and that next summer's cruise can be made many times as productive of good results as any summer in the past.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE SUBMARINE MINE[1]

By LIEUTENANT J. N. FERGUSON, U. S. Navy

With all the present-day discussion of the decadence of the dreadnought type of battleship, due to the wonderful improvements of recent years in underwater attack by submarine torpedo-boats, and the development of aerial attack from aeroplanes and dirigibles, it seems strange that little or no mention should be made of the submarine mine, a weapon which has proven its efficacy in actual warfare, and which history shows to have rendered effective service before the automobile torpedo or the aeroplane were considered possible.

It is true that both the submarine torpedo-boat and the flying-machine have been developed since the last war in which there were naval engagements of consequence, and that much may be expected of each, but the submarine mine has also been wonderfully improved in all respects during this same time.

Early Development.—It may be said that all forms of underwater attack had their beginning when David Bushnell discovered a method of exploding gunpowder beneath the surface. This discovery led him to conceive the idea of attacking vessels by attaching receptacles containing gunpowder, to be fired by a mechanism actuated by clockwork, to their underwater structures. To accomplish this Bushnell designed and built a practical submarine boat, with which an attack was made on the British ship *Eagle,* at anchor off Governor's Island, New York, in 1776. The operator, being unable to penetrate the copper sheathing at the point of attack, failed to attach the receptacle to the vessel, and the attack was unsuccessful.

The next employment of the underwater attack was with what may be termed a drifting or floating mine; Bushnell describes this as follows:

[1] This article was written before the outbreak of the present European war.

In the year 1777 I made an attempt from a whale-boat against the *Cerberus* frigate, then lying at anchor between Connecticut River and New London, by drawing a machine against her side by means of a line. The machine was loaded with powder, to be exploded by a gunlock, which was to be unpinioned by an apparatus to be turned by being brought alongside of the frigate. This machine fell in with a schooner at anchor astern of the frigate, and concealed from my sight. By some means or other it was fired, and demolished the schooner and three men, and blew the only one left alive overboard, who was taken up very much hurt.

In December of the same year Bushnell attacked the British vessels in the Delaware River at Philadelphia by setting adrift mines to be carried down by the tide. An error as to the distance and the time of the tide rendered the attack unsuccessful, although it is said that the British were greatly alarmed.

The efforts of Bushnell were not appreciated, and he was so greatly disappointed at their failure and felt so keenly the disapprobation of the public at what was termed an " uncivilized method of waging war " that he moved to a distant state and changed his name. That one of the submarine tenders now building should have the name of *Bushnell* is a fitting but tardy recognition of the genius of David Bushnell, the father of underwater attack.

Soon after the Revolutionary War, Robert Fulton, who later on built the *Clermont*, the first vessel successfully propelled by steam power, took up underwater attack and, being unable to interest American officials, went abroad, where he succeeded in destroying several old vessels, when demonstrating this mode of attack. In all attempts to use his inventions in actual service he was unsuccessful. It is said that Pitt, at that time Prime Minister of England, saw the value of the underwater attack and, much against the will of his advisers, assisted Fulton. Speaking of this, the Earl of St. Vincent said that " Pitt was foolish to encourage that gimcrack, for so he was laying the foundation for doing away with the navy, on which depended the strength and prestige of Great Britain."

Upon Fulton's return to America he met with the same opposition from the naval authorities, who foresaw that the successful use of " torpedoes," as all contrivances for exploding gunpowder under water were then called, would be to the advantage of those nations who possessed weak navies.

In the War of 1812 the British ship *Ramillies* was attacked near New London by a submarine boat, which is supposed to have

been built by Fulton. The attack was unsuccessful, except for the moral effect. An extract from a book published in 1818 says:

> So great is the alarm and fear on board the *Ramillies* that Commodore Hardy has withdrawn his force from before New London.

About 1845, Samuel Colt, the inventor of the Colt revolver, devised a method of connecting mines by insulated wires and exploding them by electricity. He demonstrated this before a Congressional committee by destroying a vessel in the Potomac River, but for some reason his designs were never adopted by the Government.

Submarine mines were used abroad in the Schleswig-Holstein War of 1848-50 and in the Crimean War, but with indifferent results.

The Submarine Mine in the Civil War.—It remained for the Civil War to prove the efficacy of the submarine mine, as well as to develop the ironclad and the turret.

The duty of the Federal Navy in this war may be said to have been:

(a) Operations against Confederate commerce destroyers.

(b) Maintenance of the blockade.

(c) Offensive operations in the rivers, sounds, and estuaries of the Confederate States.

Vessels employed against the Confederate commerce destroyers, the *Alabama, Shenandoah,* etc., were necessarily on the high seas and afforded no opportunity for mines. Those maintaining the blockade were in some instances attacked by mines, and the first *successful* employment of a submarine in actual warfare occurred off Charleston when the *Housatonic* was sunk by the Confederate *David.*

The vessels operating in the rivers and landlocked waters offered every opportunity for the successful use of submarine mines, and that more were not destroyed was due to the crude methods of construction of the mines employed against them. The following table shows the casualties in the U. S. Navy due to submarine mines during this war.

The Confederate vessels *Marion* and *Ettiwan,* which were lost off Charleston, were probably blown up by their own mines. The Confederate transport *Schultz* was accidentally destroyed by a Confederate mine in the James River while returning to Richmond with exchanged prisoners of war.

Name	Class	Locality	Extent of injury
Cairo	Armored	Yazoo River	Destroyed
Montauk	Monitor	Ogochee River	Serious
Baron De Kalb	Armored	Yazoo River	Destroyed
Com. Barney	Gunboat	James River	Serious
John Farron	Transport	"	"
Maple Leaf	"	St. Johns River	Destroyed
Gen. Hunter	"	"	"
Eastport	Armored	Red River	"
Com. Jones	Gunboat	James River	"
H. A. Weed	Transport	St. Johns River	"
Alice Price	"	"	"
Tecumseh	Monitor	Mobile Bay	"
Narcissus	Gunboat	"	"
Otsego	"	Roanoke River	"
Bagley	Tug	"	"
Patapsco	Monitor	Off Charleston	"
Osceola	Gunboat	Cape Fear River	Serious
Harvest Moon	"	Georgetown	Destroyed
Thorne	Transport	Cape Fear River	"
Althea	Gunboat	Blakely River	"
Milwaukee	Monitor	"	"
Osage	"	"	"
Rodolph	Gunboat	"	"
Ida	"	"	"
Sciota	"	Mobile Bay	"
R. B. Hamilton	Transport	"	"
Jonquil	Gunboat	Ashley River	Serious

The spar torpedo, the " first cousin " to the submarine mine and precursor of the automobile torpedo, was first used during the Civil War. Cushing sank the Confederate monitor *Albemarle* with a spar torpedo, and the Federals lost the *Housatonic*, which was sunk off Charleston by the so-called *David* submarine. The Federal monitors *Ironsides* and *Minnesota* were seriously damaged by spar torpedoes.

Up to and including the Civil War, the various types of mechanism for underwater attack were called " torpedoes," from the ray of that name which stuns its prey by electric shock. There were stationary torpedoes, drifting torpedoes, and spar torpedoes. The successful employment of the underwater attack with these types led an Austrian officer to devise a torpedo which would propel itself. From this idea came the modern automobile torpedo.

The Russo-Japanese War.—The Russo-Japanese War resembled the Civil War, in that much of the naval operations were carried on in a comparatively restricted area, the vicinity of Port Arthur. Even at this time it is difficult to obtain complete authentic data as

to the losses in this war. The following table, compiled from various sources, is believed to be authentic if not complete.

CAPITAL SHIPS

Russian flagship *Petropavlovsk* sunk returning to Port Arthur, 13 April, '04. Admiral Makaroff among those lost.

Russian battleship *Pobieda* seriously damaged at the same time.

On 15 May, '04, Japanese battleships *Hatsuse* and *Yashima* sunk off Port Arthur.

Russian battleship *Sevastopol* seriously damaged 23 August, '04.

SMALLER VESSELS

12 May, Japanese torpedo-boat sunk.
14 May, Japanese dispatch boat sunk.
4 June, Russian gunboat sunk.
3 July, Japanese cruiser *Kaiman* sunk.
27 July, Russian armored cruiser *Bayan* seriously damaged.
18 August, Russian gunboat *Otvagne* sunk.
24 August, Russian destroyer sunk.
18 September, Japanese armored gunboat *Heiyen* sunk.
30 November, Japanese cruiser *Saiyen* sunk.
..... Japanese cruiser *Tahasago* sunk.

In addition to these the Russian mining ship *Yenesei* was sunk by her own mines while laying mines in Ta-lien-wan Bay, 11 February, '04.

Aside from the actual losses inflicted, mines played an important part strategically in this war, as may be noted from the following quotation from " Aston's ' Letters on Amphibious Wars.' "

The projected bombardment of Port Arthur by the Japanese Fleet from Pigeon Bay on March 10, 1904, was abandoned because of mines laid in that bay by the *Amur* on February 23.

Ta-lien-wan was occupied May 27, and Dalny May 29, but before either harbor could be used it was necessary to clear the approaches of Russian mines, an operation which took considerable time. This necessitated landing the Eleventh Japanese Division at Yentai Bay, about ten miles southwest of Pitzuwo. This Division was moved southward to reinforce the First Division, which was watching the Russians at Port Arthur.

This occasioned a delay in advancing these troops, as both Dalny and Ta-lien-wan have railway connections and Dalny is about thirty-five miles nearer Port Arthur than Yentai Bay.

On June 26, the Japanese captured Chien-shan. The Japanese left flank was open to bombardment to the sea, and the Russians employed three cruisers, four gunboats, and fourteen destroyers for this purpose. Togo's

fleet was unable to come close enough inshore to interfere with the Russian vessels for fear of mines, from which he had already suffered such serious loss.

It would seem that careful consideration of the tables of vessels lost or seriously damaged by mines in these two wars should cause more active interest in the development of the submarine mine and in the training of a personnel to insure its efficient use in case of war.

Types of Submarine Mines.—Submarine mines may be classified in various ways:

(1) By the method of mooring; as—

(a) Ground mines, which are used in shallow water and, as the name implies, rest on the bottom.

(b) Dormant mines, which are moored at a great depth so that vessels may safely pass over them but are so arranged that they may be brought up to effective depths at will.

(c) Buoyant mines, which are moored at a fixed distance from the bottom. (It is claimed that some types of buoyant mines automatically compensate for the rise and fall of the tide, such mines are called "constant depth mines").

(d) Some mines are not moored at all. These are called "floating," "drifting," or "tactical" mines.

(2) By the method of ignition; as—

(a) Electric.

(b) Percussion.

(3) By the method in which they are employed; as—

(a) Defense, as of harbors or anchorages.

(b) Blockade.

(c) Counter mines.

(4) By the method of firing; as—

(a) Controlled, or "observation" mines.

(b) Automatic, or "contact" mines.

In this paper the classification under (4) will be followed.

Controlled Mines.—By "controlled mine" is meant a mine which can be fired or rendered neutral at will by an operator at a distant station. Such a mine may be a ground mine, a dormant mine, or a buoyant mine; it will probably be fired by electricity; and its most effective employment would be as a harbor-defense mine. Mines of this type are commonly called "observation mines," as they may be fired when the operator "observes" the target ship in the mine field.

Until the " F-rays." " wireless ignition," etc., reported periodically in the papers as having been demonstrated abroad, actually materialize, all types of controlled mines must have some connection with the control station. This is no defect for mines that are to be used in protecting a harbor, but prohibits the use of this type for purely naval purposes.

Automatic Mines.—Automatic mines are those which are fired by the action of the target ship, either by actual contact or by the disturbance of the water in the vicinity of the mine. Automatic mines may be anchored or floating; they are buoyant; they may be ignited either by percussion or by electricity; and they may be used as harbor-defense, blockade, or tactical mines.

The Hague Convention " VIII Hague, 1907 " places limitations on the use of automatic mines as follows:

THE LAYING OF AUTOMATIC SUBMARINE CONTACT MINES

Art. 1. It is forbidden:

(1) To lay unanchored automatic contact mines, except when they are so constructed as to become harmless one hour at most after those who laid them have lost control of them.

(2) To lay anchored automatic contact mines which do not become harmless as soon as they have broken loose from their moorings.

(3) To use torpedoes which do not become harmless when they have missed their mark.

Art. 2. It is forbidden to lay automatic contact mines off the coast and ports of the enemy, with the sole object of intercepting commercial shipping.

Art. 3. When anchored automatic contact mines are employed, every possible precaution must be taken for the security of peaceful shipping.

The belligerents undertake to provide, as far as possible, that these mines shall become harmless within a limited time,[1] and, should they cease to be under surveillance, to notify the danger zones as soon as military exigencies permit, by a notice to mariners, which must also be communicated to the governments through the diplomatic channel.

It may be of interest to note that Austria-Hungary, Japan, and the United States unconditionally ratified this convention; France and Germany ratified it except Article 2; Great Britain ratified with a declaration; and Greece, Italy, Portugal, Russia, Spain, and the South American republics did not ratify it at all.

Anchored Automatic Mines.—All types of anchored automatic mines should possess the following essential features:

[1] " Limited time " is not defined in the Convention.

(a) Safety in planting—a mine dangerous to the planter is an aid to the enemy.

(b) Effectiveness in action—this requires an adequate charge of explosive and a method of firing same with certainty when struck by the target vessel.

(c) Immunity against countermining—without this the explosion of one mine might fire the entire field.

(d) Efficient depth-taking mechanism and proper mooring gear—upon the depth depends to a great extent the mine's effectiveness. A mine too deep is not dangerous.

(e) Facility for rapid planting—this is especially important when planting mines under fire.

(f) Difficulty of removing by sweeping.

(g) In operation when adrift—to comply with "VIII Hague, 1907."

The only limitation as to the use of anchored automatic mines, aside from those stipulated by the Hague Convention, is the depth of water. The older types, among which may be cited our so-called naval-defense mines, were equipped with mooring lines less than one hundred feet long. The more modern types have mooring lines at least one hundred meters in length, allowing the mines to be used in depths up to fifty fathoms.

Improvements are being made almost constantly in all that pertains to submarine mines, and the various types change accordingly. A description of the Vickers-Elia, one of the best types of the anchored automatic mine, may be found in *The Naval Annual*, 1912 (Brassey), page 313.

The Unanchored Automatic Mine.—Many regard the unanchored or "floating" mine as a modern conception, but, as a matter of fact, the mine used in the attack on the *Cerberus*, the first used in warfare, was a floating mine. Several vessels were sunk during the Civil War by "drifting" mines, and it is reported that mines of this type were used by both sides during the Russo-Japanese War. It was not until the close of this war that the use of such mines was regarded as legitimate upon the high seas, but it will be noted that the Hague Conference, "Hague VIII, 1907," Article 1, forbids the laying of "unanchored automatic contact mines, except when they are so constructed as to become harmless one hour at most after those who laid them have lost control of them." With this limitation the use of unanchored mines is unre-

stricted, as they may be laid in any depth of water. For this reason they are sometimes referred to as "tactical mines," as it is thought by some that they may be used in battle to restrict the enemy's sea room, placing him upon a "lee shore," as it were.

Requisites of Unanchored Automatic Mines.—The development of unanchored automatic mines has not kept pace with that of the anchored types. It may be stated that the successful unanchored automatic mine should possess the following features:

(a) Safety in planting.

(b) Effectiveness in action; as with the anchored type this requires an adequate explosive charge with a method of firing same with certainity when struck by the target vessel.

(c) Facility for planting; these mines should be of such shape and weight as to permit of planting by hand without tracks or other special fittings.

(d) Safety from firing by wave action; these mines must be fitted for use in the open sea in all kinds of weather.

(e) Loss of effectiveness in one hour; to comply with "Hague VIII, 1907."

(f) As the effective life of these mines is limited to one hour, they should be of cheap construction, in order that great numbers can be used as desired.

Use of Submarine Mines.—In a recent letter to the London Times, which has evoked much discussion, Admiral Sir Percy Scott states:

> The functions of a vessel of war were:
>
> Defensively—1. To attack ships that come to bombard our ports.
> 2. To blockade an enemy.
> 3. To convoy a landing party.
> 4. To attack the enemy's fleet.
> 5. To attack the enemy's commerce.
>
> Offensively—1. To bombard an enemy's ports.
> 2. To blockade an enemy.
> 3. To convoy a landing party.
> 4. To attack the enemy's fleet.
> 5. To attack the enemy's commerce.
>
> The submarine renders 1, 2 and 3 impossible, as no man-of-war will dare to come even within sight of a coast that is adequately protected by submarines. Therefore, the functions of a battleship as regards 1, 2 and 3, both defensively and offensively, have disappeared.

There are many who take issue with this statement, as well as with another in the same letter that there will be no use for battleships to attack the enemy's fleet, as the submarines will not permit the enemy's fleet to put to sea. No one questions, however, that aerial scouting, combined with underwater attack, will effect great changes in the methods of conducting war at sea. Without entering into the argument as to whether aeroplanes and submarines will drive the battleship from the seas, I desire to invite attention to the fact that the submarine mine is a factor which should not be overlooked, whether used in conjunction with or opposed to the submarine and aeroplane.

With both aerial and sub-surface craft the human element is predominant; fatigue, sea-sickness, cold, darkness, all tend to diminish the efficiency of the crews and consequently to impair the efficiency of these craft. The submarine mine is as effective in darkness as in daylight; it is not affected by fog, rain, cold, or storm; once planted, its effectiveness is independent of the human element. As an auxiliary to the aerial scouts and submarines in defensive operations it is invaluable. Opposing them, it may be noted that it is the one weapon which is as effective against the submarine as against surface craft. The aerial scout may assist the submarine to avoid mines, but in discolored water or when the surface of the water is disturbed by wind it will be difficult to detect them.

In concluding I wish to state that although the gun and the automobile torpedo are the primary weapons of naval warefare, and no effort should be spared to develop them to the utmost and to train our personnel for their efficient use, the attention of the service should be brought to the fact that as a weapon of offense, as well as of defense, we cannot afford to neglect the submarine mine.

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TIMMONS, SIGNAL QUARTERMASTER, U. S. NAVY

A TRUE STORY OF WHAT MIGHT NOW VERY WELL BE CALLED THE OLD NAVY

By Pay Director J. A. Mudd, U. S. Navy (Retired)

The editor of the U. S. Naval Institute Proceedings asks for "sea yarns." The answer should be a wealth of anecdote that would make a classic for future generations. But the response must come quickly or there may be none at all. This age of censorship or its like is squeezing out the romance from naval sea life; and, as for the living custodians of sea lore, most every week we tramp away to the Valhalla-like groves with the remains of one of their fast diminishing number.

In my day I have heard hundreds of original stories that were good enough to print for the archives of the naval world, but, alas, now, they are mostly melted into but a beautiful haze of sunset colors, a gorgeously confused memory of an atmosphere of bright wit and jolly companionship. And through that treacherous memory lurk personal experiences, where I stood on the stage of events, if only as a super, when a "yarn" was born—when the strange thing actually happened, when the once-upon-a-time of now was the present day then.

When the mail brought this last number of the Proceedings, in which the editor asks for stories, or such like, there had just been opened a packing box that had withstood the latent dangers of storage for over a generation, and from it had been drawn a midshipman's log book, gun division muster and note book and other relics. With the incentive of the worthy editor's request and the refreshment of these old books, there is little difficulty in stepping silently back over 35 years to find one's self again on the deck of the most beautiful second-rate corvette that Uncle Sam ever owned. There is no use boring any one with description or per-

sonal introduction all around. But it would be a happiness to have you meet the whole crew, especially the petty officers, those veritable sea giants, nearly all having fought and many bled in the Civil War. For the moment, though, let us glance aft, and then perhaps you will be wondering why you are not introduced personally to that squint-eyed old salted salt who stands at the break of the poop, near our captain, with a spy glass held—well, the way they used to hold them, you know. Two reasons for my apparent rudeness: hatred and fear of that old squint eye and affection and fear of the captain. However, standing aside here, out of hearing, will you listen to the tale of the old fellow with the spy glass? Although I must admit that it would be interesting to hear also about the captain, a skipper that would carry his stunsails until the lower stunsail boom would cuss him out in such threatening creaks of agony that the midshipman of the forecastle would have to make the gang around the pivot clear out for their lives—a fit captain for that beautiful ship.

The old pirate by the captain is Signal Quartermaster Timmons; and, indeed, he is worthy of this long introductory road of words to reach him, a sort of commodore's sweep of an approach. When a gang of midshipmen fresh from graduation came on board, at the closing of the Victorian seventies, to take charge of the ship, one of our first knock-outs received in those early weeks of a thousand knock-outs was from Timmons. It was bad enough to have the officer-of-the-deck keep telling us to be (you know) quick about it; to have the senior ensign in the steerage tell us he must have the upper shelf of our one locker for his use, as his three lockers were not enough; to have the first luff tell the coxswains to steer all boats until he found out more about us; and so on, one public degradation after another, until we almost felt like crawling into an empty scuttle butt and weeping it full of tears to end our misery; but when Timmons turned us down flatly it seemed that we were flattened out so flat that nothing was left to crush.

Timmons owned the poop, but we didn't know it—at first. We thought the captain, the officer-of-the-deck, the gentleman of the watch, had some rights there; but the ugly situation soon unfolded itself. The captain, for instance, only enjoyed the poop by carrying on a continual quarrel with Timmons; all day long, all the time, they were sassing each other and growling back and forth. The captain was the only one in the ship, naturally, who had a right to

sit on the signal chests (those were the days when *sailors* did not stand in gangways, sit on hatch combings, or stop half-way up or down a ladder for a chat). As soon as our captain would settle comfortably on a chest Timmons wanted something in it; and sometimes when the old man was not feeling well he would refuse to get up. Then would be a hullabaloo likely. The officer-of-the-deck would shout why in the good world the meal pennant was not hoisted, say; and Timmons would bellow back that the captain was on the signal chest and he couldn't get in it. But we always had a suspicion that those two old heroes of the sea had a sneaking admiration for each other.

As for the officer-of-the-deck and Timmons, it was different. The latter was too good a man-o'-warsman not to know that the officer-of-the-deck was everything and spread over even a signal quartermaster. So he showed a dignified respect for the office, at least if it happened to be filled by a wardroom officer. But, oh, the midshipman of the watch, or even the wet-nursed midshipman of the deck, how different as to contact with Timmons! There were no words, only a settled look of most intense, cold haughtiness, that at intervals, when necessary, when the midshipman tried to think he was it, by giving an order or looking at something that all good officers-of-the-deck should examine, would turn into an expression of disgusted weariness. Even now it makes one shiver when he thinks of those mournful watch hours of imbecility and punishment walked under the eyes of Timmons.

At the start there was mentioned a spy glass, and there is a little story about it. The glass was found in the general equipment of the ship when commissioned, and it was a wonder indeed. Why, it might have been good enough to use as a preventer telescope at the Naval Observatory. At sea there was little need for it, as there never was anything to sight but water on that old Pacific Ocean; but in port, with Timmons' eye at one end, its stunts would be considered mere fairy tales if related anywhere except at the barracks of a navy yard. Many a time, when the captain was expecting some Central or South American governor, general, or such, Timmons, with his glass pointed at the town far off on shore, would prepare the way by such warnings as these: "He's putting on his shirt, sir, in the back room"; "he's taking another drink now, sir"; "he's sat down again in the front room and smoking another cigarette, sir"; "he's getting in the carriage at the front

door, with only one epaulette on, sir"; "the nurse has brought out the other epaulette, sir"; "he's just stepping into the boat behind the landing, around the point, sir"; and so on, until the swarthy gentleman, with his Parisian embroideries of precious metals, was puffing and saluting in front of our skipper on the quarter-deck. Now, what other glass could do such things? Timmons kept it in a locked cubby inside one of the poop lockers. None of the four quartermasters dared touch it, if he could. The captain had it grudgingly at times with Timmons standing by with an outstretched hand. The officer-of-the-deck (the real article) got it when he asked for it, but while he had it Timmons would do nothing else, no matter what the call might be, until it was returned to his sheltering, akimbo arm. When a midshipman asked for it he didn't get it—only silence accompanied by one of those haughty looks of intense surprise (there were plenty of other glasses around, but they were dull clodhoppers compared to the marvel). All sorts of subterfuges were resorted to by us young scions of Annapolis to get a look through the magic glass—but never success.

To end this tale of the spy glass appropriately, its finish will be related. One day we were getting ready for pretty times in port and sending down chafing gear. A half-baked sailor up under the mizzentop (the beautiful ship was full rigged) let drop a heavy mat. On its hurried way to the home of gravity this mat had to pass right through Timmons and the spy glass standing at the break of the poop. It made Timmons see crooked stars out of his crooked eyes and then slapped the glass right out of his hands. The glass bent the poop rail but got several ribs broken doing it. It leaped high in the air and came down on the conning binnacle below on the quarter-deck; that was a draw, with both sides badly battered. Then it flew off sideways until it smashed in a sickening way against an iron gun carriage. If it hadn't hurt so, one would have thought it a regular cut-up, glad to get away from Timmons. The captain saw it all—and so did a certain midshipman, who looked at the captain in silent awe—but he was so shaken with laughter (he was a big man) that the round shot in the racks on the steerage hatch combings jumped and bumped, and the boarding pikes around the mast rattled in a merry dance. That was the cue for the midshipman, the stiffening of his backbone; he turned towards Timmons and laughed and laughed and laughed and kept on laughing till the watch was over.

Let us shift the scene to the navy yard at Mare Island, with the same ship, captain, Timmons, midshipmen, et cætera. The sound of revelry, gutted music and voices of the angel-sex had floated through the still air of the night before, for there had been a big ball in the sail loft. The ships and navigation department of the yard had contributed all the flags and other bunting that could be spared for the decorations. On this morning to which you are brought there had been a round up by each ship's signal quartermaster of his belongings and the toting of them back to his ship; also a gathering in and inventory by the navigation department of the yard. At high noon there was the deuce to pay. The chief of the navigation department, flushed with excitement, hopped from one ship to another along the water front to tell the various skippers that some one of them had on board a brand new No. 1 U. S. ensign belonging to the yard stock, purloined from the sail loft decorations. Every one who has ever gone to sea knows that a No. 1 flag is the prettiest thing ever made by mortal man (or woman)—at least a United States one; and that, as for its dimensions, well, it is just a great lot of feet in length, and, as for its cost, well, it is a lot of money.

No one had the flag, and the commandant of the yard ordered a search and inventory of the navigator's storerooms and flag lockers on all the ships; but nothing turned up. Somehow or other, suspicion seemed to center on our ship, although we considered ourselves the pride of the Pacific, and all the others but old tubs with job lots of officers and men and signal quartermasters. As a final effort, the captain had Timmons up on deck to face the scrutinizing angry gaze of the worried navigation officer of the yard. Timmons really looked as if he was sorry for the officer (of course, under the circumstances, the board of survey fixed him up all right), but, as ever, stoutly denied any knowledge. With a curious wave of his hand toward the spanker gaff, as if in a vision he saw something flying there in the future, he exclaimed, "Captain, I hope to die an afterguardsman if I know anything about that flag," and then, as a clincher, "Why, captain, I have plenty of my own; if I had that flag, don't you suppose I would say so?"

Months after, it was a bright Sunday morning in the Mexican port of Acapulco, and just the kind of a day for general muster in white. Before quarters, those coming on deck could not help noticing drooping from the peak in the lazy air, and occasionally

floating out in red, white and blue rolls, to show its beauty, a magnificent new ensign. It was a strange sight, as the ship had been in commission for nearly three years and all its bunting outfit showed wear. The captain finally came stepping up the poop ladder sideways, as was his wont. When he got to the top he stopped as if he had seen the ghost of all his babyhood sins. By and by his jaws began to work, and then presently out of them began to come sounds, and then the sounds resolved into, "Timmons, Timmons, where is he?" Timmons was just around the other side of the mast and came over looking as much like pleasant as he could ever look, which was nothing to speak of. "Timmons," now fairly thundered the captain (and he had a voice like a sea god of the deep), "Where did you get that flag?" Timmons slowly followed, with a surprised air, the finger point of the captain until his eye struck the peak of the gaff, and then he turned with a look of entire unconcern and replied, "Oh, I picked that up when we were last at Mare Island." . . . . And not long afterwards the bell for "church" was tolling through the sweet soft air, and everything was quiet along the strand of Acapulco Bay.

Yes, Timmons was one of the great men of the navy, just like our captain. Many a time I've glanced up from the quarter-deck at the two on the poop, standing out against the light, and thought that there indeed were symbolized the power, the sailor ability, the dignity, and the biting qualities of our navy. The despise for Timmons was caused by wounded self-conceit, and we in our hearts respected the old fellow and knew him to be large in his place.

It was our ill-fortune finally to witness his complete fall. It was on this wise: The navigator had his storeroom in the forepeak, together with the doctor's and some other storerooms and the sail locker. That forepeak was a black hole of Calcutta, especially at sea, and the doctor's smelly drugs helped it to its reputation. Nothing ordinary could exist there year in and year out. Even such a stout, lusty thing as our mizzen storm staysail, on being broken out off the mouth of the Columbia, on an unpleasant morning, gave one frantic, ripping cry, as it threw up both hands and snapped away to leeward in ribbons; it had sickened into a spineless thing after a long, undisturbed sojourn in that forepeak. But Timmons used to take a siesta right down there in his little storeroom most every afternoon and come forth apparently refreshed each time.

In a Chilian port, the assistant surgeon bought a large jar of very strong native liquor, a sort of white brandy, as a souvenir of his stay. The jar was of the kind and size that is seen on the stage in the setting of the Forty Thieves, so you can imagine the quantity of foreign, contrabrand stuff that was quietly stored away in the medical room, next to Timmons' pavilion. It was a most unsailorlike trick to try to stow such a fragile package, with such contents, on board a ship; but please note that the young doctor had not shipped as a boatswain or captain of the hold. One afternoon, at sea, things were rough. The young medical man slept on a transom in the steerage; the apothecary, custodian of the keys to the storeroom, slept on a transom in his shop; and Timmons slept down there forward in his cubby, and all was rollingly and pitchingly serene until something protested loudly, smashingly and gurglingly in the doctor's storeroom against an unusually bad lurch of the ship. The neighborly noise waked Timmons, way there forward, while the doctor and the apothecary slept on quietly, way there aft. Timmons sniffed and pinched himself, then opened his door and stuck his face against the other storeroom door, then dropped suddenly to the deck of the little passageway or country. There, coming over the low sill of the medical room, at every lurch of the ship, was the cause of the smell that had drawn the old man—the contents from the broken jar inside. . . . . Long after, he was missed and sent for, but he didn't come aft. They carried him in a heap to the brig, with his tongue unconsciously lapping out at the air. They had found him thoroughly anointed inside and out with the strong waters, still clutching the brass cap of a spy glass which he had used as an auxiliary to his tongue in gathering unto himself this strange luck. The low sill or combing around the base of the doctor's storeroom, with the tight deck, had made a fine receptacle for the released liquor, which at every roll dished out an overflow to the waiting Timmons.

Afterwards, at the mast, when he was able to face justice, as the thing is called in legal parlance, there was no laugh in any of us. He stood there as sad a sight as any sorrow loving kill-joy might wish to gaze upon. He was horribly unnatural, the twist of his cock eye seemingly gone, and there was a detestable air of shop-made humility about him. He smelt like a distillery that had been shut down and shut up and shut in for a month. Well, let us draw the veil over the legal proceedings: I never enjoyed reading about

Napoleon after Waterloo and at St. Helena. But it must be said, although with great reluctance to criticise the skipper behind his back, he being gone now from this world, that I never understood why Timmons was broken that day. The captain certainly did not do it for personal reasons, as he must have missed his old friend from the poop. It is simply a case of different viewpoint, I suppose; and I have never been a captain. And it is well to remember that there was a somewhat different viewpoint in regard to "rum" in those days, and some of us were a quite innocent lot of freebooters who knew not at all that alcohol was the king poison to our modern Christian civilization.

I might say here that the captain ought to have done something to the doctor, but I won't, as that young man is gone, too, these many years. Apropos of the doctor, do you know that he had the wildness to say that Timmons broke his jar and it was not the lurching of the ship, and that, therefore, it was by no means a plain case of salvage. All he had to present for this statement was an augur hole between the two storerooms, probably a bungling job of a navy yard workman months before, and absolutely unknown to such a man of affairs as Timmons. We all thought the doctor's idea nonsense, at least most all, for it was not known what the captain thought. Indeed nonsense, that a little augur hole an inch in diameter could break a great big jar three or more feet high. I mention this at the end to show to what absurd lengths anger and anguish can send an ordinarily well poised mind.

Timmons is gone now, of course, for when we midshipmen sailed under him he must have been at least a hundred. If he ended his days at the "White House" it was an easy, comfortable closing, no doubt: all the carefully selected governors and officers of that home have ever loved the old Timmons kind of chaps. And the beautiful ship is but a shade, in the ghostly armada of ships that have passed; and there's hardly an anchor watch left of her crew, forward or aft.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

AEROPLANE DESIGN

By Assistant Naval Constructor J. C. Hunsaker, U. S. Navy

It has now come to be recognized that the design of aeroplanes can be based upon the information supplied by tests made with reduced models in an artificial current of air. Such tests determine the coefficients to be used in certain fundamental equations, and the problem of design is one of making use of the information available to attain a desired result. In many ways, aeroplane design and ship design are similar. In both we must estimate weight and strength from previous craft known to be satisfactory in operation. At the same time, for our particular design, a model must be tested in the model basin, if a ship, or in the wind tunnel, if an aeroplane, in order to know with certainty the power necessary to meet our limiting conditions.

As is well known, an aeroplane is sustained in the air by the reaction of the air upon its wings, which are propelled through the air at high speed inclined at a small angle. The total reaction or force of the air on an aeroplane wing is found to be well enough represented for the purposes of design by the formula:

$$R = KSV^2. \qquad (1)$$

where K is a constant for any given wing shape and given angle of incidence.

S is the area in square feet of wing surface.

V is the velocity in feet per second relative to the air.

The vertical component of the total force of the air on the wings must balance the weight of the machine. This lift is represented by:

$$\text{Lift} = W = K_y SV^2. \qquad (2)$$

Where W is the total weight of the aeroplane and K_y is a constant for given wing form and incidence.

The horizontal component of the total force of the air on the wings is in a direction opposed to the motion of the aeroplane and hence is a head resistance. It is represented by:

$$R_w = K_x S V^2. \tag{3}$$

Where R_w is the head resistance of the wings and K_x is a constant for given wing form and incidence.

Unfortunately, it is not possible to make an aeroplane of wings alone, and a body or "fuselage" and tail, together with wing supports and landing gear or "chassis" is required. These parts do not add to the lift of the wings, but do add both weight and head resistance. The head resistance of the aeroplane fuselage, tail and chassis is best determined by testing a model in a wind tunnel after having removed its wings. This body resistance can be represented by:

$$R_b = K_b V^2. \tag{4}$$

Where K_b is a constant. This formula is only used for an estimate, and it cannot be considered precise as it ignores the effect of change in inclination and ignores the experimental discovery that with long bodies where air friction is an important part of the resistance, the total resistance varies not as V^2 but more nearly as $V^{1.9}$. However, the difference is unimportant for the purpose of a preliminary design calculation.

The total resistance to motion is the quantity,

$$R_w + R_b = (K_x S + K_b) V^2, \tag{5}$$

which must be equal to the thrust of the propeller, or

$$(K_x S + K_b) V^2 = T. \tag{6}$$

The effective power required to move the aeroplane with a speed V feet per second is therefore:

$$\frac{TV}{550} = P = \text{horse-power}. \tag{7}$$

$$\therefore P = (K_x S + K_b) \frac{V^3}{550}. \tag{8}$$

For wings and body of a given type, the above equations involve the following elements:

W = total weight in pounds.
V = speed in feet per second.
S = area of wings in square feet.
$K_x = f(i)$ = resistance coefficient.
$K_y = f(i)$ = lift coefficient.
i = angle of chord to wind.

R_b = resistance of body, etc., without wings. There are thus but five variables, and from them the thrust and power may be calculated.

K_x and K_y are each some function of the incidence, but the relation is not a simple one, and it is best to use characteristic curves of K_x and K_y plotted on i from experimental model tests.

In the past, it has been the practice for an aeroplane builder to construct a machine and then to try various sizes and types of motor and propeller until a satisfactory performance was obtained. He then offered duplicates of this perfected machine for sale, making a guarantee of performance. There is no rational procedure in such a method, and besides being costly, as all trial and error methods are liable to be, is also contrary to sound engineering practice. It is much preferable to make the trials on the drawing board and in a preliminary design calculation, attempting to make the best use of the material available. After a design has been worked out which appears to justify full scale construction, it then may be further verified by model tests in a wind tunnel. Before risking money and time in building (and life in testing) a new design, its probable behavior can be predicted from its so-called characteristic curves. The characteristic curves as calculated are approximations and must be used with discretion, but they furnish valuable information upon which to decide whether the specifications are likely to be met with economy of material.

In Europe, aeroplanes are no longer bought by their trade names, but are required to meet definite specifications. The necessity for designing to meet given specifications has led to an intensive study of the aeroplane and very material improvement in safety, stability, radius of action and range of speed. After the

inventor, has come the engineer and with him the testing laboratory and an analysis of a great part of a very foggy state of affairs.

Unfortunately, the engineer who is skilled in aeroplane design is such an asset to his firm that little or nothing is published regarding his detailed methods. For example, we know that in the past year a British biplane has been observed to leave the ground with a speed of about 40 miles per hour and, with fuel for three hours flight and a passenger, reach a speed in the air of over 90 miles per hour. Naturally, the details of this machine cannot be kept secret, as it is a commercial article. But it is not easy to learn how the designer went about his problem merely from an inspection of the aeroplane.

The great demand at the present time is safety, endurance and speed.

Safety is an indefinite term, but fairly well understood. It must depend on:

(1) Structural strength in the air.
(2) Controllability in the air.
(3) Inherent stability in the air.
(4) A wide margin of excess power always available.
(5) A high speed in the air.
(6) A low speed near the ground.
(7) An effective landing carriage.
(8) Protection against fire.
(9) A prudent pilot who keeps within prescribed limits of incidence and speed.

The problem of structural strength in the air is a matter of engineering. The forces involved are known and an ample factor of safety is introduced to take account of reversals and vibration. For example, the wings of the latest British Army machines are reported to be designed to support a load of from six to eight times the total weight of the machine.[1] In all countries, structural failures are rare and strength no longer presents a problem of difficulty.

The matter of ease of control has been solved by the French, and it now remains to introduce insufficient inherent stability in the aeroplane without sacrificing too large a degree of its controllability. There is reason to believe that these two requirements are not incompatible.

[1] Engineering, London, May 22, 1914.

The theory of aeroplane stability has been placed on a firm mathematical basis, following the classical method of Rigid Dynamics, by Prof. G. H. Bryan of England.[2]

Mr. Leonard Bairstow[3] of the National Physical Laboratory, England, has succeeded in determining the constants required in Bryan's equations of motion by direct experiments on small models. More recently still the Royal Air Craft Factory, England, has built a military biplane on conventional lines, but with a proportion of fin and tail area calculated by Bryan's method using Bairstow's model research. This machine has proved both easy to control and inherently stable in flight. It is reported that once clear of the ground, the pilot need only steer with his rudder even in gusty winds.[4] A wide divergence from standard type in search of the same object is illustrated by the Dunne tailless biplane. The problem of stability cannot yet be dismissed as solved, for just now the theory is in advance of practice. It is only a question of a short time, however, when the stability of aeroplanes will be as generally understood as is the stability of ships; and, as in the case of ships, our problem is to get enough stability, but not too much. The technical discussion of aeroplane stability cannot well be developed in this paper.

Granted stability of the aeroplane, we have not secured safety unless the other considerations enumerated above are satisfied. The aeroplane being a dynamic machine, its presence aloft is absolutely dependent on its relative speed. With each speed there is one and only one attitude of the aeroplane (in the upright position), and it is here proposed to study the characteristics of the aeroplane from consideration of variations in speed and power. Speed and power are fundamental in design and fundamental for safe operation. Stability may well be considered apart during the first consideration of a design.

APPLICATION TO A PARTICULAR PROBLEM

Let it be a high speed military scout that is required for service with the marines on an expedition into the interior of some state. The nature of the service is such that quick action is required and

[2] "Stability in Aviation," Bryan, MacMillan.

[3] "The Stability of Aeroplanes," L. Bairstow, Flight, London, January 24, 1914.

[4] London Times, May 20, 1914, Col. Seely, Minister of War, discussing demonstration of *RE-1* in a gusty wind of 28 miles per hour.

obviously quicker scouting is necessary. Aside from racing machines which are not reliable, a speed of 90 miles per hour is as much as could be required. The marine column cannot afford to wait for its news, so that the scout would be required to proceed at full speed. Let us further decide that a flight of six hours, or 540 miles, is contemplated, and that a passenger must be carried, but no machine gun or bombs. The aeroplane is not to be armored. Safety in landing requires a speed of at least 45 miles an hour, and the aeroplane should get away from the ground at a speed not greater than 50 miles an hour. True, it would be preferable to leave the ground at 30 miles, but in view of the great speed required, it is unfair to specify so great a speed range in the present stage of the art.

The aeroplane is to be used in hostile country as a scout. It must operate at a height of 3000 feet when in danger and at other times must risk flying nearer the ground. A large climbing speed is, therefore, vital. A heavy biplane is usually good for 300 feet a minute. Let us here specify that it shall start to climb at 600 feet per minute.

We may now summarize the specification and consider the type of aeroplane:

(1) To carry two men.
(2) To leave ground at 50 miles an hour.
(3) To land at 45 miles an hour.
(4) To fly six hours at full power or 90 miles an hour.
(5) To climb 600 feet a minute.

It is evident that we shall have to deal with a very heavy machine. Two men for six hours at 90 miles an hour is considerably in advance of the standard machines. From a table of the weights and dimensions of the principal aeroplanes built in 1913-1914, it appears that there are some 10 machines which show a speed of about 45 to 80 miles an hour. The weights average about one ton (2240) pounds and the horse-power of their motors ranges between 90 and 160. Tank capacity is from four to five hours. All these machines are biplanes. Monoplane construction for machines weighing over one ton is unsuitable, although speeds over 100 miles an hour may be reached on small monoplanes. For our problem, there is a legitimate question whether a monoplane or a biplane type should be adopted. It will later be shown from considerations of aspect ratio and span

that the biplane is preferable. We may take as a first approximation that our machine will weigh over one ton and will require about 120 horse-power to drive it. In view of the six-hour endurance requirement, it is important to use the smallest motor practicable to keep down the gasoline consumption per hour.

CHOICE OF MOTOR

We have two main types of motor to select between. The rotary air-cooled motor of low weight per horse-power, but rather uneconomical, and the stationary water-cooled type, heavier, but more economical of fuel. We must select that motor whose gross weight plux six hours fuel and oil supply is least.

Let t = duration of flight in hours.
V = speed in miles per hour, a constant.
D = distance flown in miles, a constant.
P = brake horse-power of motor, a constant.
a = gross pounds per horse-power of motor.
c = pounds oil and gas per horse-power hour.

The fuel and oil supply is therefore: tPc.

Tanks and pipes can be estimated at $\frac{1}{6}$ of the weight of liquid provided. Then:

Total supply weight $= \frac{7}{6}tPc.$
Total motor weight $= Pa.$
Total power plant weight $= P(a+\frac{7}{6}tc) = L.$

For the best fixed type motor, the weight including radiator, water, magneto, etc., is about 5.3 pounds per horse-power, with a fuel and oil consumption of .66 pound per horse-power hour. This applies to the best German motors such as the "Benz" and "Mercedes." For rotary motors, such as the "Gnome," the unit weight is $\frac{3}{5}$, and the fuel and oil consumption at least $\frac{3}{2}$ the above respectively.[5]

Substituting these values in the above equation for L, the total power plant weights are:

$120(5.3+\frac{7}{6}\times 6\times .66) = 120\times 9.92 = 1190$ lbs. fixed type.
$120(\frac{3}{5}\times 5.3+\frac{3}{2}\times 6\times 6.6) = 120\times 10.10 = 1213$ lbs. rotary type.

[5] Dr. Bendemann of the Adlershof Testing Laboratory in "Zeitschrift der Flugtechnik und Motorluftschiffahrt," April 25, 1914.

For six hours run there is then small choice between the two types so far as weight is concerned. However, in view of the greater reliability and robustness of the water-cooled type it should be selected. For any endurance longer than six hours at full power, the water-cooled type is obviously lighter.

Let us then search the published reports on motor tests for a suitable water-cooled motor of about 120 horse-power. The Salmson (Canton Unné) rated 120 horse-power motor, nine cylinders in star, develops 120-125 horse-power at 1300 revolutions per minute. It was run 100 hours with four stops of eight minutes each at the Chalais Meudon competition of the "Aero Club de France." It is, therefore, sufficiently reliable for our purposes. The weight is given as follows:

	Pounds
Motor complete with magneto, 2 carburetors, oil pump, water pump, piping, etc.	436
Double radiator, empty	53
Cooling water in radiator and motor	42
Total	531
Hourly consumption:	
Gasoline	76.0
Oil	4.4
Total	80.4
Oil and fuel for six hours $= 6 \times 80.4 =$	482.4
Tanks and pipes $= \frac{1}{6} \times 482.4 =$	80.4
Total	562.8
Power Plant Weight.—Grand Total	1094

This compares with a weight of 1190 pounds by taking Dr. Bendemann's figures quoted above for the best German motors. The check is reasonable and we are assured of having no handicap at the start from excessive motor weight.

Personnel.—The weight of personnel may be taken at 320 pounds, allowing for men of average weight.

Useful Weight.—The total useful weight, personnel and fuel is then about 883 pounds. In the 10 biplanes used above for comparison, the useful weight is from 30 to 50 per cent of the total. We will probably wish to provide a very substantial structure and

may select the figure 35 per cent to be on the safe side. This indicates a total weight of about 2500 pounds which seems reasonable.

Fuselage.—It is next necessary to rough out the design of the body or fuselage. It must be of size sufficient to house the pilot and passenger, tanks, etc., and provide motor foundations. Mounting the propeller on the nose of the machine is most suitable for the Salmson motor. The diameter of the body will then be in the neighborhood of three feet at its maximum section. For a 90-mile machine, every effort must be made to keep down body resistance. A length of at least six diameters gives a good torpedo-shaped form. We then have a length of some 20 feet. This shell will be made up of ash or steel longitudinals with wooden hoops spaced at intervals. Its weight can best be estimated after plans are made. For our problem, we cannot expect to get sufficient stiffness on less than 200 pounds.

Chassis.—The chassis, or landing carriage, must also be designed if its weight is to be estimated with precision. Since our machine weighs over a ton and has a landing speed of between 45 and 50 miles an hour, we will need the most rugged chassis we can afford to carry. For military work, where landings on bad ground are likely, a four-wheeled chassis of Voisin or Bristol type is suitable. Effective springs and shock absorbers must be provided. Steel tubing is heavy but not easily splintered. At the same time, it is more difficult to repair in the field than wood. In case we use either material it is impossible to have the chassis too strong. Rather, the problem is to design as strong a chassis as possible for the weight allowed. Considering other heavy machines, we may be safe in allowing 200 pounds for the chassis.

Tails and Controls.—Our machine weighing over a ton must have wings of about 400 square feet area if we allow six pounds per square foot loading. This is the upper safe limit for such a great spread of wings. It will then be necessary to design the tail surfaces on the basis of wind tunnel tests to obtain inherent stability.

The horizontal tail surface in machines with good longitudinal stability is about one-fifth the wing area. The horizontal rudder area is included in this. Vertical fins and rudders may total one-tenth of the wing area. For purpose of weight estimate, we have

then some 120 square feet of directive surface which may be taken to weigh complete with bracing some 100 pounds.

We may now assemble these rough weight estimates as follows:

	Pounds
Gross motor weight	531
Oil, fuel and tanks	563
Propeller and hub	24
Personnel and equipment	320
Fuselage	200
Chassis	200
Directive surfaces	100
Biplane struts and wires	45
Total weight without wings	1983

Weight of Wings.—The weight of wings varies with the type of construction and factor of safety allowed. The Royal Air Craft Factory, England, finds that the following empirical formula well expresses the weight of their wings, including fabric and enamel:

$$\text{Wing weight} = 17A^{\frac{1}{2}} + 0.16A.$$

Where A is the area in square feet.

We can then prepare the following table:

Area of Wings	Weight of Wings	Total Weight of Aeroplane
0	0	1983
100	186	2169
200	272	2255
300	343	2325
400	404	2387

The size of wings to use is a matter of judgment. Weight is saved by keeping the wings small, but practical considerations impose a limit. It is not safe to impose too large a load per square foot with wings of great area. Large slow biplanes are given a wing loading of four pounds while small fast monoplanes of the racing machine order show a wing loading of over 11 pounds per square foot. Values of wing loading tend to increase in the past year. The following curve represents current practice.

It appears that the curve drawn represents an upper limit, or for a 400 square foot wing six pounds is high and for a 300 square foot spread seven pounds is high.

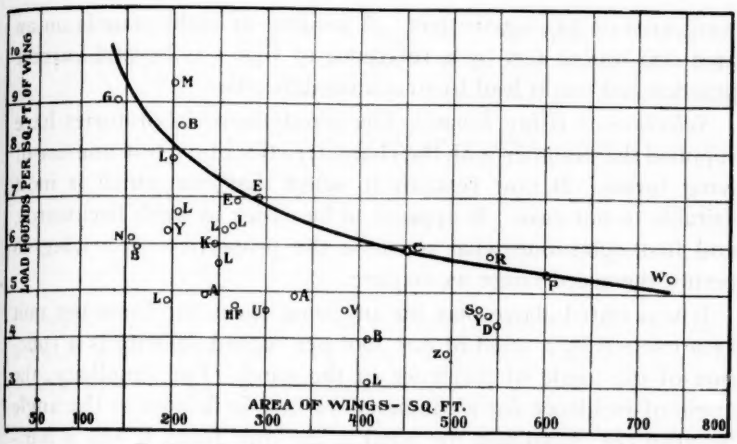

FIG. 1

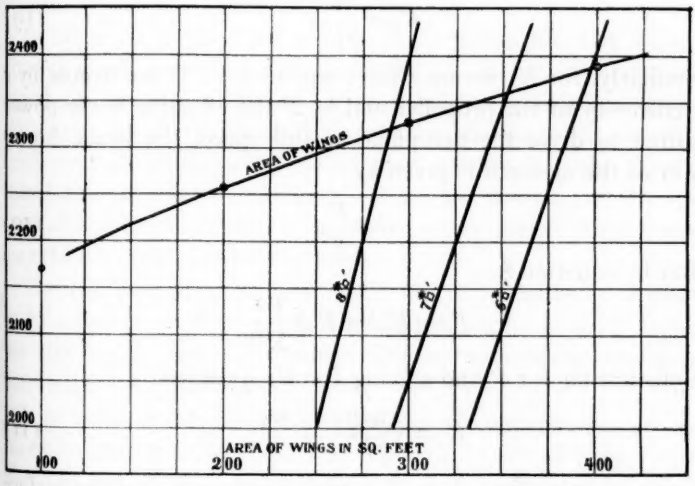

FIG. 2

On Fig. 2, are shown the curves for wing loadings of six, seven and eight pounds intersecting the curve of total weight of aeroplane. Thus, if we select a loading of six pounds a wing area of 400 square feet is needed, and for a loading of seven pounds a

wing area of 353 square feet. A loading of eight pounds on an area 290 square feet by a reference to Fig. 1 is beyond current practice and might lead to structural difficulties.

Selection of Wing Form.—The aerodynamic laboratories have supplied the designer with the characteristics of a great number of wing forms. It now remains to select that one which is most suitable to our case. It appears to be easier to work backwards, and first determine what must be the properties of a wing to permit the speed range we require.

It was stated above that for any wing form, the force per unit area exerted by a wind of one foot per second velocity is a function of the angle of incidence of the wind. For simplicity, the angle of incidence for a cambered surface is defined as the angle between the chord and the wind. The unit force K has a horizontal component K_x and a vertical component or lift K_y for each angle of incidence.

To satisfy the conditions of our problem, we may solve equation 2 for K_y, thus:

$$K_y = \frac{W}{SV^2}. \tag{9}$$

Similarly, for K_x we may solve equation 8. If we denote by e the efficiency of the propeller and by P the effective horse-power required to drive the aeroplane at full speed, the brake horse-power of the motor B is given by:

$$B = \frac{P}{e}. \tag{10}$$

But by equation 8:

$$P = (K_x S + K_b)\frac{V^3}{550}.$$

Substituting for P and solving for K_x we have:

$$K_x = \frac{550Be}{SV^3} - \frac{K_b}{S}. \tag{11}$$

For a wing loading of seven pounds per square foot the surface S is 353 square feet. $B = 125$ horse-power. The propeller efficiency at full speed may be taken at 78 per cent and no allowance made for loss of efficiency at slow speeds until the final calculation. The solution of equations 9 and 11 may be tabulated as below:

V miles per hour.....	40	45	50	60	70	80	90	100
V ft. per second	58.6	65.8	73.2	88	102.5	117.3	132	146.5
K_y.....	.00204	.00162	.00131	.000904	.000667	.000508	.000403	.000327
$\frac{550\,Be}{SV^3}$	.000751	.000531	.000386	.000222	.00014	.000094	.000066	.000048
$\frac{K_b}{S}$	.000032	.000032	.000032	.000032	.000032	.000032	.000032	.000032
K_x.....	.000748	.00050	.00035	.00019	.00011	.00006	.000034	.000016

Similarly, for a loading of six pounds per square foot the wing area is 400 square feet with other constants unchanged. The following table may be prepared:

LOADING SIX POUNDS PER SQUARE FOOT

V miles per hour.....	40	45	50	60	70	80	90	100
K_y.....	.00174	.00139	.00112	.000774	.000571	.000435	.000345	.00028
K_x.....	.000662	.000444	.00031	.000168	.0000975	.0000532	.0000302	.0000142

In order to support the weight of the aeroplane, any wing we choose must develop a lift coefficient K_y at each speed exactly equal to the K_y calculated as required for the given loading. Similarly, to drive the aeroplane at each speed the resistance coefficient K_x of the wing must be not greater than the K_x above calculated for the given loading. If K_x for the wing at any speed is smaller than K_x required, an advantage is gained, for the motor may then be run at reduced power.

The corresponding values of K_x and K_y required are plotted as two curves on Fig. 3, one for the six pound loading and one for the seven pound loading. The corresponding speeds are marked along the curves.

It is usual in the reports of aerodynamic experiments on wing forms to give a table of K_x and K_y for a series of angles of the chord to the wind. On Fig. 3 are then plotted the characteristic K_xK_y curves for a number of wing forms. These values have been taken from various sources and transposed to English units; *i. e.*, pounds force per square foot for a wind velocity of one foot per second; normal barometer and temperature. The angles of incidence as above defined are marked along each wing curve.

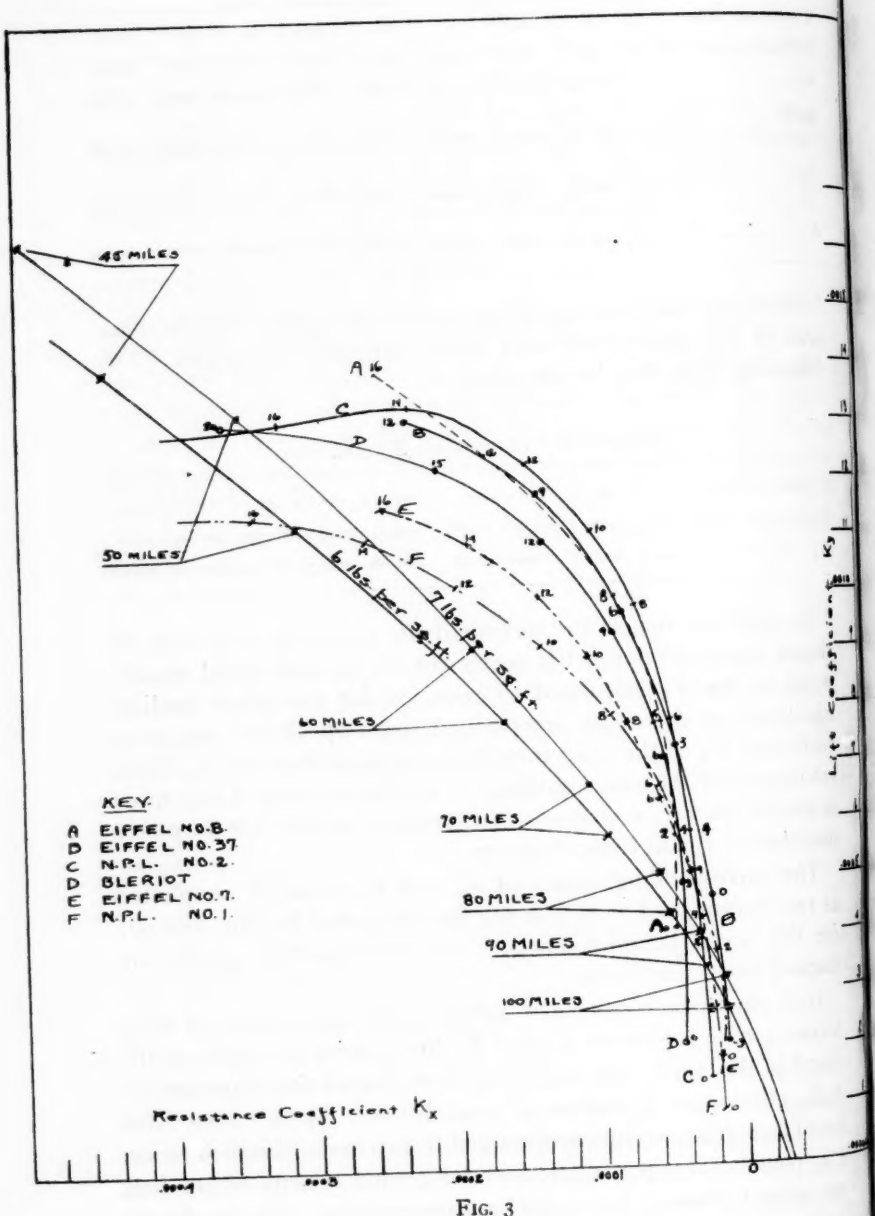
45 MILES
50 MILES
60 MILES
70 MILES
80 MILES
90 MILES
100 MILES
6 lbs per sq ft.
7 lbs per sq ft.
KEY
A EIFFEL NO. 8.
B EIFFEL NO. 37.
C N.P.L. NO. 2.
D BLERIOT
E EIFFEL NO. 7.
F N.P.L. NO. 1.
Resistance Coefficient K_x
Lift Coefficient K_y
.0004
.0003
.0002
.0001
0

FIG. 3

The lower intersection of the characteristic curve for any wing with one of the curves of required K_x and K_y indicates the conditions under which that wing will be suitable. From the numbers marked along the curves, one can read off the speed of the aeroplane and the angle of incidence of the wings. For example, for a loading of seven pounds and wing marked "Bleriot," a speed of some 86 miles only can be reached with an incidence of about 2.5°. The upper intersection of the same curves shows a speed of a little over 50 miles for an incidence of about 19°. Obviously, the Bleriot wing cannot meet our specifications. A similar analysis can be made for each of the other wing curves taken in connection with each wing loading curve.

It is seen that with the seven pound loading several wings give a speed of 90 miles an hour, but there is difficulty in reaching the low speed below 50 miles. It should be remarked here that, in general, the wing curves intersect the loading curves in two points. However, in many cases the upper end of the wing curve cannot be produced far enough to obtain an intersection because the angle of maximum K_y is reached for a small value of K_x. This, however, is in our favor as showing a K_x coefficient less than the maximum allowable on the loading curve for 125 horse-power. The upper intersection can then be found by drawing a horizontal line from the highest point of the wing characteristic curve until it cuts the two loading curves.

From a consideration of the diagram of Fig. 3, we would conclude to use a wing loading of six pounds per square foot. It is also noticed that all wings give a speed under 50 miles an hour, and three give speeds over 90 miles an hour. The selection of one of these three wings is a matter of judgment.

Before the days when inherent longitudinal stability could be given an aeroplane, the designer was careful to use a wing with an incidence of at least two degrees on the theory that if the machine flies at a small angle, a sudden pitch may be enough to change that angle to negative and thus throw the pressure on the top of the wings. A good many men have been pitched out of their seats under such circumstances. It is now recognized, however, that the angle of incidence is an arbitrary quantity as defined. The chord in many wings may be inclined at a negative angle from 3° to 5° before the lift becomes zero. For example,

wing Eiffel No. 37 lifts more at $-3°$ than NPL No. 1 [6] at $+1°$. The inference is that they are equally far from the incidence of zero lift. Further experiments are required on this point and before completing a design the wing chosen should have its characteristic determined for all probable angles of incidence.

With a machine with a large non-lifting tail slightly inclined upwards, the tail in normal flight can be made to take a downward reaction of some 4 per cent of the total weight of the machine. In such a case, the center of gravity is a few inches in front of the center of pressure of the wings, and there will be one and only one angle of incidence at which these three forces balance. Any pitching of the aeroplane is the cause of a restoring couple to return the machine to its original trim.

The man must be strapped in always with a quick release toggle and flying at a good elevation when at full speed.

In view of adequate longitudinal stability [7] it does not appear wise to shun the small angle with its consequent advantages of high speed on low power. The arguments that showed a small incidence to be dangerous for an unstable machine no longer have force.

It is therefore possible to choose for our design wing Eiffel No. 37 [8] giving a speed of over 96 miles an hour for an incidence of $-2°$ and a speed of about 47 miles an hour for $12°$. The high speed is ample, but the low speed does not quite meet our specifications. However, it appears to be a better solution than any of the others. This is the price that must be paid for high speed in the air.

The above method of selecting a wing from its characteristic curves was suggested by M. Eiffel.[9] In fact, the whole procedure of representing the properties of a wing in terms of its coefficients and incidence is due to this remarkable engineer. His method is applied here to a specific case.

Unfortunately, the intersection of the curves on Fig. 3 is very sharp and the results are at best approximate. The diagram is to

[6] Data from Technical Report of Advisory Committee for Aeronautics, 1911-1912, London.

[7] Refer to Lanchester, "The Aeroplane from an Engineering Standpoint," Engineering, London, May 8, 1914.

[8] Data published in "Aerophile," Paris, May 15, 1914.

[9] "La Résistance de l'Air et Aviation," Paris, Dunot et Pinat, 1912.

be used only as a ready means of comparison to avoid the solution of the same problem six times to learn which of six wings is the best for a given problem. The performance of the aeroplane, climbing, etc., is not brought out for intermediate speeds on this plot. Later, a complete analysis of probable performance will be made.

Monoplane vs. Biplane.—The question of aspect ration, or ratio of span to depth of wing, has purposely not been introduced. The above characteristic curves are all drawn for an aspect ratio of six. It is found by experiment that with increase of aspect ratio K_y is increased for the same incidence and K_x very little altered. For a monoplane of 400 square feet area the span cannot be allowed to exceed 40 feet. This gives a depth of wing of 10 feet or an aspect ratio of four. A biplane of same span would have a depth of wing of five feet and an aspect ration of eight. The gain in lift in going from aspect ratio four to aspect ratio eight is in the neighborhood of 15 per cent in favor of the biplane. On the other hand, the ordinary biplane spacing of gap between wings equal to chord produces interference in the flow of air and a loss of lift of from 20 to 25 per cent under the equivalent monoplane of same aspect ratio and incidence. Recent experiments have shown however, that more than half of this loss may be made up by staggering the wings of the biplane and inclining the forward wing at a slightly greater angle than the other. The exact degree of staggering and difference in inclination must be worked out by experiments on models in an artificial current of air. It is assumed that such tests would be made before this design is completed. It is reasonable to conclude then that the values of the coefficients for an aspect ratio six, as used above, may safely be applied to our design if we use a biplane of aspect ratio eight, with a proper degree of stagger.[10] We could even expect a slight margin of lift in our favor which later could be used to carry additional weight of gasoline.

Before leaving the question of wings, it may be of interest to remark that wing Eiffel No. 37 has a best ratio of lift to resistance of 20. This is then the most effective wing of which there are any published tests. The usual wing has a lift to resistance ratio of

[10] The Sopwith biplane which won the Monaco meet in May has wings staggered as above suggested.

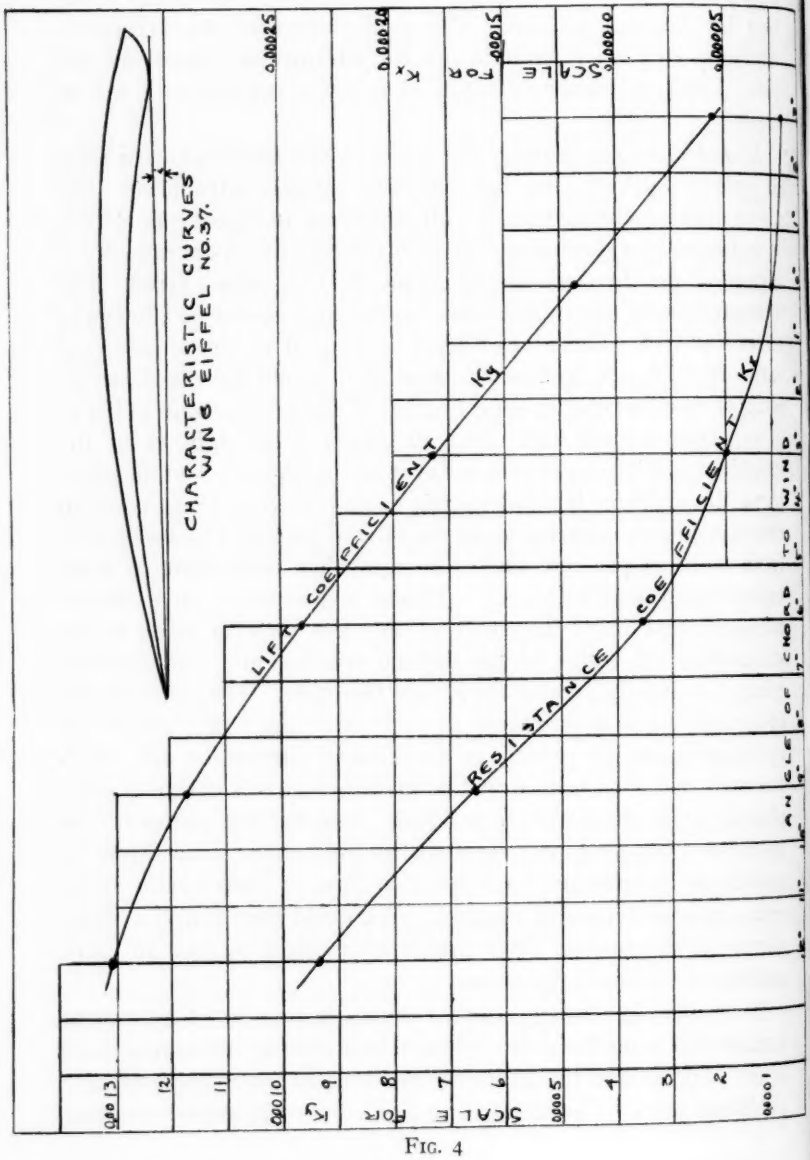
CHARACTERISTIC CURVES
WING EIFFEL NO.37.
LIFT COEFFICIENT Kz
RESISTANCE COEFFICIENT Kx
Kx FOR SCALE
Kz FOR SCALE
ANGLE OF CHORD TO WIND

FIG. 4

15. Its curvature is shown on Fig. 4. On the same sheet are given the curves of K_x and K_y plotted on angle of chord to wind. These are for use in the subsequent calculation for resistance.

POWER AND RESISTANCE CURVES

Having determined the principal dimensions of our aeroplane and having some assurance that the specifications may be met, we wish now to analyze its probable performance and to design a propeller to satisfy the problem. The method of drawing resistance curves is that used at the Royal Air Craft Factory, England. We will compute for a series of speeds the resistance of the aeroplane, and hence the thrust the propeller must develop at each speed. Similarly, we will compute the effective power required at each speed which is equal to the propeller power that must be supplied.

We have computed above the value of K_y required at each speed to exert a lift of six pounds per square foot on the wings and hence to sustain the aeroplane. From the characteristic curves on Fig. 4 we can pick out the angle of incidence i corresponding to each of the values of K_y. We have then the inclination of the wing chord at each speed and hence have fixed the attitude of the machine. For each angle of incidence i there corresponds a resistance coefficient K_x which is picked off the K_x curve for the wing. The wing resistance is then computed for each speed by:

$$R_w = K_x S V^2.$$

The resistance of body, chassis, struts and wires does not in any way contribute to sustentation, but absorbs a great deal of power. Every effort will be made to reduce this to a minimum. From published tests on miscellaneous objects it is possible to compute the resistance of each part and then sum up to get the total passive or body resistance. The method is long and very approximate on account of rather arbitrary allowances that must be made for the sheltering of parts which are partly in the lee of other parts. The most trustworthy method is to make a model without wings at this stage in the design, and to test it in a wind tunnel. For want of a better guide, let us accept as true that we are unable to reduce the body resistances more than the Royal Air Craft Factory designers succeeded in doing with the *BE-2*. Tests on

that aeroplane complete with fuselage, chassis, etc., but without wings, showed that the so-called body resistance is given by the equation:[11]

$$R_b = .01132V^2.$$

We will then compute R_b for each speed and tabulate it below. The sum of wing resistance and body resistance is the total resistance to motion and must equal the propeller thrust:

$$T = R_w + R_b.$$

The product of thrust by velocity gives the effective horsepower expended in driving the aeroplane:

$$P = \frac{TV}{550}.$$

[11] Since the above was written, the Technical Report of the Advisory Committee has appeared in which, on page 250, it is shown that the body resistance first estimated should be increased by 40 per cent to allow for the effect of the propeller race and to take account of more recent tests in the wind tunnel. The detailed estimate is given as follows and is reproduced as of particular interest to designers. The resistance of our aeroplane may then be increased 20 per cent and the maximum speed reduced to show 94 miles an hour. The minimum speed is unchanged.

BODY RESISTANCE OF *BE-2* AEROPLANE AT 60 MILES AN HOUR

Struts:	Pounds
8, 6′ 0″ × 1¼″	4.2
4, 4′ 0″ × 1¼″	1.4
6, 3′ 0″ × 1¼″	1.6
Wire:	
220′ cable	29.5
70′ wire	5.6
50 turnbuckles	3.0
Rudder and elevator	2.0
Body with passenger and pilot	40.0
Axle	2.0
Main skids and axle mounting	1.0
Rear skid	.5
Wheels	3.5
Appendages and miscellaneous	10.0
Parts exposed to slip stream of 25′ per sec.: Body; 4, 4′ 0″ struts; ⅔ of 3′ 0″ struts; 50′ cable; 50′ wire; rudder and elevator rear skid, fittings, etc., calling for an augment of resistance of	35.7
Total	140.0

This quantity is tabulated for each speed in the following table:

WING EIFFEL NO. 37. LOADING SIX POUNDS PER SQUARE FOOT. AREA 400 SQUARE FEET. STAGGERED BIPLANE. ASPECT RATIO EIGHT

V miles	46.5	50	60	70	80	90	100
V ft. per second	68	73.3	88	102.7	117.4	132	146.6
K_y	.0013	.001116	.000774	.000571	.000436	.000345	.00028
i	12.0°	8.15°	3.65°	1.2°	−0.4°	−1.45°	−2.2°
K_x	.000234	.000141	.000055	.000032	.000022	.000020	.0000175
$R_w = K_x S V^2$	432	302.5	169.6	134.2	121	139	143
$R_b = .01132 V^2$	52.3	60.8	87.6	119	156	197	243
$T = R_w + R_b$	484	363	257	253	277	336	386
$P = \frac{TV}{550}$	59.9	48.4	41.1	47.3	59.2	80.6	103

The results of this calculation are shown graphically by a series of curves on Fig. 5, following the method of the Royal Air Craft Factory.

It appears from this plot that the body resistance which varies as the square of the speed plays an unimportant part at speeds below 55 miles an hour. In the first Wright aeroplanes of low speed, no effort was made to keep down body resistance, and the pilot and passenger were seated side by side on the lower wing entirely exposed to the wind. Above 75 miles an hour, the body resistance is greater than the wing resistance on account of the fact that the latter decreases very rapidly for the smaller incidence employed at high speed. The importance of minimizing body resistance for a high speed machine is obvious. In our design, motor, tanks, personnel and equipment will be completely sheltered inside a torpedo-shaped fuselage. Struts will be given a stream line section, wires will be replaced as far as possible by steel ribbons, and the cooling radiators carefully chosen and carefully located with a view to keeping head resistance low. In general, no appendages or projections will be allowed, all control wires being enclosed within the fuselage. The chassis will be made of steel tubing of egg-shaped section, having the blunt end forward. All struts and braces should have the rear edge fined by use of special sections or application of wooden " fairwaters." Wheels of the chassis have the spokes covered with fabric or sheet aluminum.

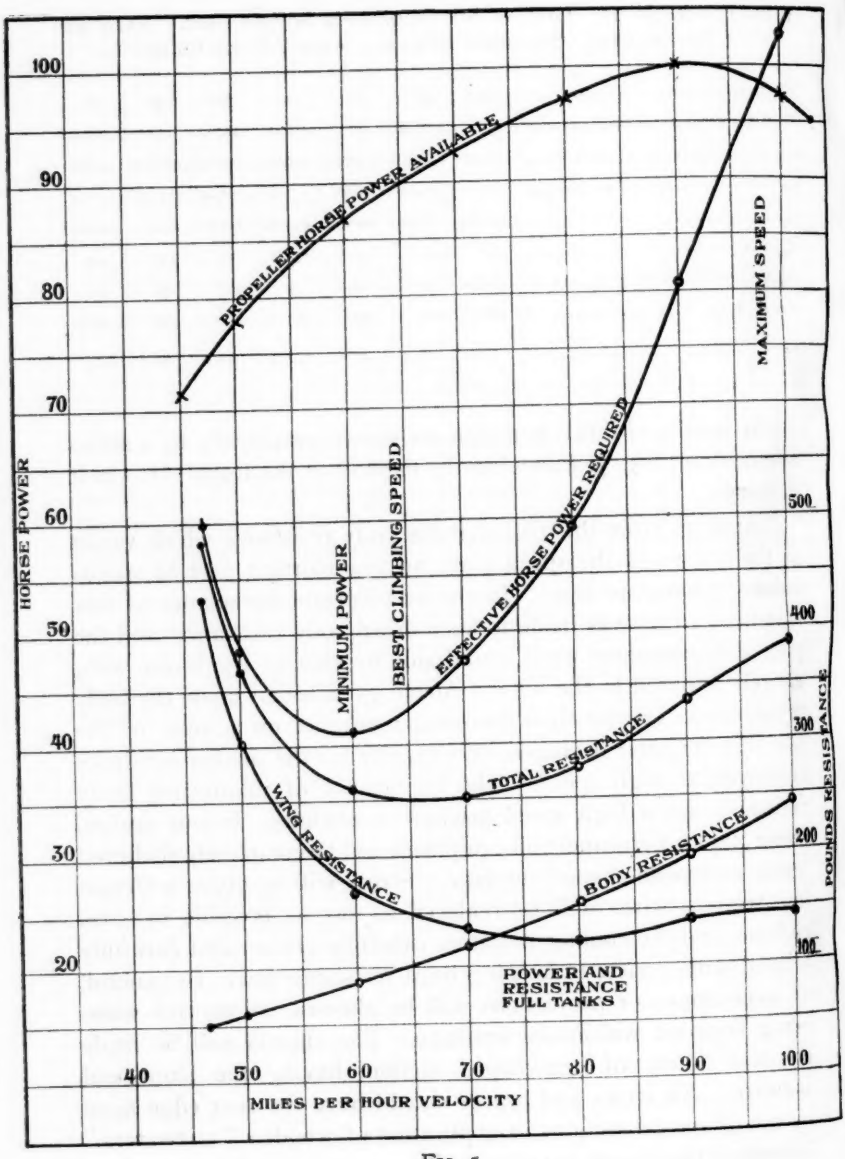
HORSE POWER
100
90
80
70
60
50
40
30
20
PROPELLER HORSE POWER AVAILABLE
MAXIMUM SPEED
MINIMUM POWER
BEST CLIMBING SPEED
EFFECTIVE HORSE POWER REQUIRED
TOTAL RESISTANCE
WING RESISTANCE
BODY RESISTANCE
POUNDS RESISTANCE
500
400
300
200
100
POWER AND RESISTANCE FULL TANKS
40
50
60
70
80
90
100
MILES PER HOUR VELOCITY

FIG. 5

The total resistance curve shows a high maximum at low speed due to the great incidence of the wings required for sustentation. A high propeller thrust is therefore required.

The curve of effective horse-power is of greatest interest to the designer. This curve shows at every point the power required to drive the aeroplane. For flight to be possible, the propeller must be able to supply at least this power. From the relation,

$$\text{Propeller power available} = \frac{\text{Thrust} \times \text{Speed}}{550},$$

it follows that if the propeller delivers sufficient power it also delivers sufficient thrust to drive the aeroplane. The power required curve is then the only curve that must be considered.

In general, for any power there are two speeds at which the aeroplane can fly. For example, for 60 effective horse-power, the horizontal power line intersects the power required curve at two points corresponding to 46.5 and 80 miles an hour. The machine has the wing chord inclined 12° in the former case and −0.4° in the latter case. For any power between 41 and 60 there are two such flight speeds possible, corresponding to the two branches of the power required curve. French writers have indulged in considerable discussion with regard to the advantages of making use in practice of both branches of the curve and so obtaining a slow landing speed.[12]

Suppose the aeroplane is flying at about 80 miles an hour with motor throttled down to give 60 propeller horse-power. The incidence of the wings is then −0.4°. If the pilot wishes to climb over a small hill, he will raise his elevator and throw the machine into a larger angle of incidence, for example, + 1.2°. For this incidence, the machine will tend to slow down to 70 miles an hour, but at that speed only requires 47 horse-power. The propeller is still delivering approximately 60 horse-power or an excess of about 13 horse-power. This excess of power will be expended in

[12] Alexandre Sée, "Les Lois Expérimentales de l'Aviation," Paris, Gauthier-Villars, 1912, page 200.

Capitaine du Gênie Duchene, "L'Aéroplane etudié et calculé par les Mathematiques Élémentaires," Paris, Librairie Chapelot, 1913, page 116.

J. Bordeaux, "L'Aéroplane, Etude Raisonnée," Paris, Gauthier-Villars, 1912, page 223.

lifting the machine as a whole, giving it a vertical component of velocity, calculated from

$$\text{Excess power} = \frac{\text{Total weight} \times \text{Climb per second}}{550}.$$

The machine thus takes an upward inclined trajectory as desired.

Conversely, to descend, the pilot decreases his incidence to $-1.45°$, for example. At this incidence, a speed of 90 miles is necessary for sustentation and 80 horse-power. The propeller is only giving 60, and hence the necessary 20 horse-power must be supplied by the machines falling at a rate V feet per second given by:

$$20 \text{ H. P.} = \frac{\text{Total weight} \times V}{550}.$$

The machine then speeds up and descends as desired.

In practice, the pilot need not know the change of incidence he produces. A careful man moves his elevator slowly until he has placed himself on the desired trajectory. Part of the art of aviation is to do this without exceeding safe limits, for obviously there is a limit to the rate of climb his motor can handle. If the machine is put on a climb too steep for the power of the machine, the speed is suddenly lost, the controls become ineffective and the machine has "stalled." It may side slip, settle back on its tail and in response to the pilot's efforts to level up may take a steep dive. This all is dangerous, especially if the ground is too near.

To consider the left branch of the power curve, called the "régime lent," as distinguished from the "régime rapide," suppose the pilot by a suitable manipulation of controls has put his machine at an angle 8.15° and is flying at 50 miles with 49 horse-power. If he wishes to rise, he naturally puts the machine as before at a greater angle, say 12°. The machine slows down to 46.5 miles. At that speed and angle 60 horse-power is required. His propeller is only giving him 49 horse-power and the aeroplane will descend at a sufficient rate to make up the difference. On the other hand, if he wishes to descend and so reduces his incidence to 3.65°, the aeroplane tends to speed up to 60 miles. For this speed only 41 horse-power is required and the machine will climb at a rate to about 8 horse-power, excess power given out by the propeller. Consequently, his controls are reversed, when

he heads down he rises, and when he heads up he descends, provided he does not manipulate his throttle. For a pilot who is not familiar with this abnormal behavior of his machine, the " régime lent " is unsafe and he should not attempt to fly at speeds lower than 60 miles an hour. To avoid danger, an air speed indicator should be before his eyes so that he may be warned before losing too much speed.

It has been recently demonstrated that an expert flyer can operate an aeroplane in the slow speed region by manipulation of the throttle alone. The recent speed variation contests abroad have placed a premium on low speed and formed the inducement to pilots to attempt the region of reversed controls. The usual method is to observe by the speed indicator that the aeroplane has passed below its critical speed and then to control elevation by use of the throttle alone. Thus to descend, power is shut off, and to rise more gas is turned on. A flexible motor is, of course, very necessary. With a large reserve of power, an aeroplane can be made to climb out of any difficulty. The matter of low speed is a question of skill of the pilot, and is dangerous when not understood.

Limits of speed and climb, being primarily based on power available, it remains now to consider the calculation of this quantity at all speeds. At the present time, no satisfactory method has been developed to determine in advance the propeller performance at all speeds. In fact, the whole method of propeller design is largely a matter of trial and error in an effort to hit on a propeller suitable to the motor and to the aeroplane. It is even urged that the best method is to try several propellers and to adopt that one which gives the greatest pull when the aeroplane is held to a stake by a spring scale.

The problem differs in no way from the propulsion of a ship except that there is less information available derived from experience.

A gasoline motor develops its full power at one speed of revolution and at no other. The power falls off directly as the revolutions. The propeller must then turn at a fixed rate in order not to handicap the motor. On the other hand, at any speed the aeroplane has a definite resistance which must be overcome by the propeller thrust. The slip of the propeller, if run at constant revolutions, increases with slower aeroplane speeds. The efficiency of the propeller is a maximum at one slip and less for values of slip

above and below this figure. It is a question of judgment to decide for what speed of the aeroplane the propeller efficiency shall be a maximum.

From a consideration of the effective power required, as given by Fig. 5, it appears that at high speeds we need all the power we can get. At low speeds, an inefficient propeller will probably give power enough.

Let us then design our propeller to give its maximum efficiency at 90 miles an hour. The Salmson motor develops 125 horsepower at 1300 revolutions per minute, which must be the propeller speed. To develop maximum power, we will run the propeller at 1300 revolutions per minute for all speeds of the aeroplane.

The problem then is to design a propeller to absorb 125 horsepower at 1300 revolutions per minute and to develop a thrust of 380 pounds at 90 miles an hour. The resistance of the aeroplane is only 340 pounds at 90 miles, so we are allowing a margin for safety of 40 pounds thrust.

The rational method of propeller design devised by M. Stefan Drzwiecki can be applied now, and a propeller designed with the assurance that it will come within 5 or 10 per cent of the calculated values. We have a tolerance above of 10 per cent. It is of interest to note that the Drzwiecki theory is more often found to underestimate than to overestimate. The detailed method is described by M. Drzwiecki[13] and further amplified by the graphical method used by the Royal Air Craft Factory.[14]

The method is long and involves the graphical integration of the pressures over the propeller blade. The detailed design of a propeller cannot well be attempted here.

An application of the theory of similitude is developed in Appendix I, with a view to making use of M. Drzwiecki's propellers tested full size on the electric railway of the University of Paris.

Three propellers are found to give an efficiency of 80 per cent—a remarkable performance. Not to burden the body of this paper, we will extract the data obtained by the process explained in the Appendix.

[13] "Des Hélices Aériennes," Théorie Générale des Propulseurs helicoïdaux, S. Drzwiecki, Paris, F. Louis Vivian, 1909.

[14] Technical Report of the Advisory Committee for Aeronautics for the year 1911-1912, London, His Majesty's Stationery Office, Report No. 65 by Mervyn O'Gorman, Superintendent, Royal Air Craft Factory.

Propeller prototype, St. Cyr No. 8.[15] Revolutions per minute, 1300. Diameter, 7.55 feet. Two blades. Material, walnut. Power absorbed from motor, 125 horse-power.

Miles per Hour	Thrust Horse-Power
45	71.2
50	78.0
60	86.8
70	92.5
80	96.8
90	100.0
100	97.5

The thrust or propeller horse-power as given above is plotted as a curve of power available on Fig. 5. Flight is possible so long as the power required curve does not exceed the power available. It is seen that the maximum horizontal speed is about 98 miles an hour. The slowest speed is given by the speed at which the planes lose their lift, 46.5 miles an hour, and is not limited by the propeller power. At 46.5 miles an hour there is 13 horse-power excess available for climbing. It is, therefore, practicable to fly the machine at 46.5 miles an hour. This may be taken as the minimum landing speed. The aeroplane also could leave the ground at this speed if the pilot were careful to reduce his inclination as soon as he was clear of the ground. This would increase his speed to 60 miles, and give an excess power of 45 horse-power with full throttle opening tending to make the machine climb rapidly to clear nearby fences and trees.

In flight, speeds between 60 and 98 miles an hour are available by throttling down. At the maximum speed, the radius of action of six hours gives a flight of 588 miles. This is based on the weight of the machine with full tanks. As time goes on, the machine is lightened by consumption of gasoline and flies at a smaller incidence with less power. The radius of action is therefore greater than 588 miles. Account of this will be taken later.

The greatest margin of power is 47 horse-power at 65 miles an hour. This is the difference between ordinates of the two power curves. Consequently, 65 miles an hour is the best horizontal speed for climbing. A rate of climb with full tanks is then:

$$V = \frac{47 \times 33{,}000}{2387} = 650 \text{ feet per minute.}$$

This is well over our specification.

[15] Bulletin du Laboratoire Aérotechnique de St. Cyr, University of Paris, 1913.

The minimum power to fly is 41 horse-power at 60 miles an hour. With a motor missing fire badly, the pilot should regulate his speed to 60 miles if possible until a landing can be made.

It is shown in the Appendix how to estimate the variation in propeller power with speed for full throttle opening, as well as for reduced power. The variation of propeller efficiency and the consequent propeller power are calculated for 1300, 1000, 900, 800, 700 and 600 revolutions.

On Fig. 6, the effective power required curve is again laid down and across it are plotted curves of propeller horse-power for various throttle openings. It is seen that the speed of the aeroplane for maximum propeller efficiency at reduced power falls off so rapidly that, in general, the propeller is working at excessive slip and consequent reduced efficiency. Part of the saving of fuel by running at reduced power is therefore lost in the propeller.

The most economical speed is that speed which will give the greatest radius of action. The fuel tank capacity is constant so that the duration of the flight in hours is proportional to:

$$\frac{\text{Tank Capacity}}{\text{B. H. P.}},$$

assuming the same economy of the motor at full and reduced power. The motor is likely to be more economical at reduced power. The distance flown is proportional to velocity times time, and since tankage is constant, varies as

$$\frac{\text{Velocity}}{\text{B. H. P.}}.$$

The maximum radius is given then by that speed for which $\frac{V}{\text{B. H. P.}}$ is a maximum.

We must then find a curve of brake horse-power referred to V as abscissæ.

The radius of action is naturally dependent on weight, so allowance must first be made for the lightening of the aeroplane as fuel is consumed.

Take first the condition at the end of the flight with tanks practically empty. The machine is lightened by 483 pounds of fuel and oil, giving a total weight of 1914 pounds. The wing loading is now 4.82 pounds per square foot of wing area. The

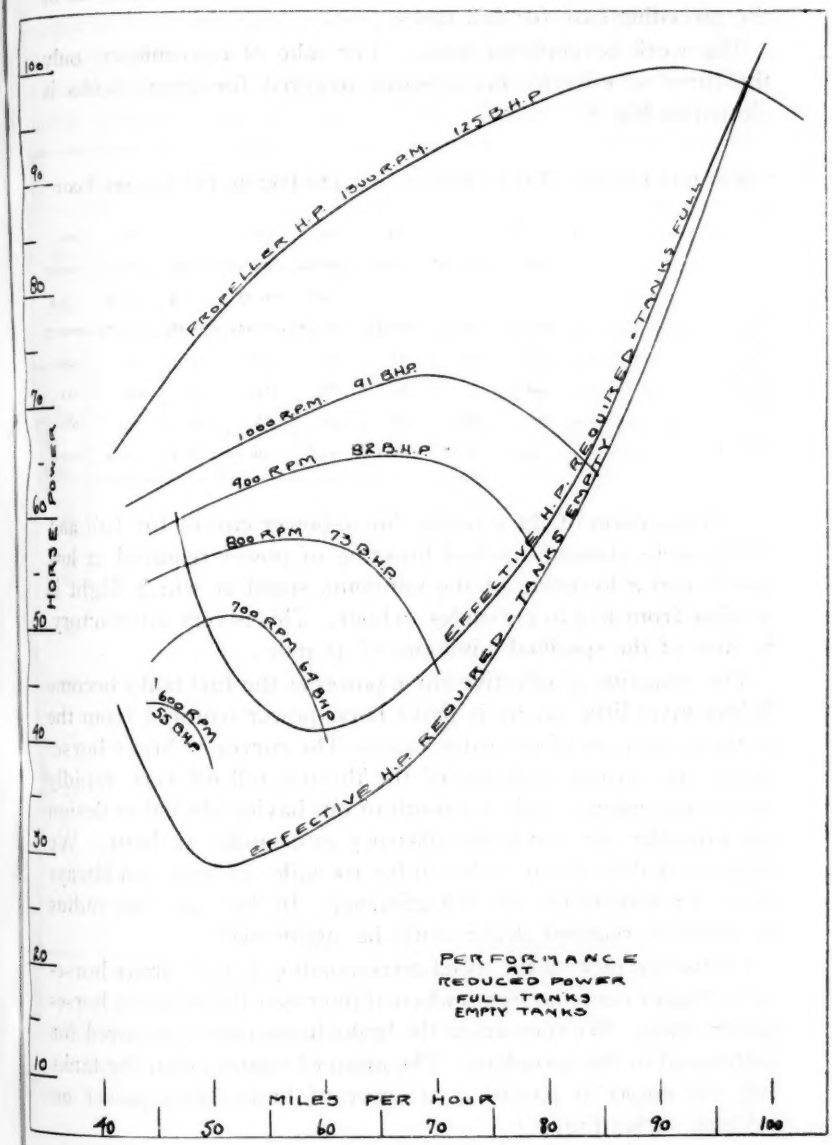
HORSE POWER
100
90
80
70
60
50
40
30
20
10
PROPELLER H.P 1300 R.P.M. 125 B.H.P
1000 R.P.M. 91 B.H.P
900 R.P.M. 82 B.H.P
800 R.P.M. 73 B.H.P
700 R.P.M. 64 B.H.P
600 R.P.M. 55 B.H.P
EFFECTIVE H.P. REQUIRED - TANKS FULL
EFFECTIVE H.P. REQUIRED - TANKS EMPTY
PERFORMANCE AT REDUCED POWER
FULL TANKS
EMPTY TANKS
MILES PER HOUR
40
50
60
70
80
90
100

FIG. 6

power and resistance curves can now be constructed exactly as in the preceding case for full tanks.

The work is tabulated below. For sake of convenience, only the curve of effective horse-power required for empty tanks is plotted on Fig. 6.

$W = 1914$ POUNDS. TANKS EMPTY. $a = 4.82$ POUNDS PER SQUARE FOOT

V	41.6	46.5	50	60	70	80	90	100
K_y	.0013	.001045	.000896	.000622	.000458	.00035	.000277	.000225
i	12°	7.1°	5.2°	1.85°	−0.15°	−1.5°	−2.25°	−2.9°
K_x	.000234	.000115	.000073	.000038	.000023	.000185	.0000175	.0000175
$K_x SV^2$	348	212	157	117	96	102	122	143
$K_b V^2$	42	52	61	88	119	156	197	243
T	390	264	218	205	215	258	319	386
E. H. P.	43.3	32.7	29.1	32.8	40.2	55.1	76.5	103

A comparison of the effective horse-power curves for full and empty tanks shows a marked lowering of power required at low speeds and a lowering of the minimum speed at which flight is possible from 46.5 to 41.6 miles an hour. This is very satisfactory, in view of the specified minimum of 45 miles.

The reduction of effective horse-power as the fuel tanks become lighter gives little saving in brake horse-power required from the motor on account of propeller losses. The curves of brake horse-power for various openings of the throttle fall off very rapidly from a maximum. This is a result of our having elected to design our propeller for maximum efficiency at 90 miles an hour. We might have done better to design for 100 miles an hour and always work at a little below the best efficiency. In that case, the radius of action at reduced power could be augmented.

Let us now pick off the speed corresponding to each brake horse-power motor curve on Fig. 6 where it intersects the effective horse-power curve. We then know the brake horse-power required for each speed of the aeroplane. The mean of values taken for tanks full and empty is plotted as a curve of brake horse-power on velocity. (See Fig. 7.)

We have shown above that the most economical speed gives a maximum for the ratio $\frac{V}{\text{B.H.P.}}$. As is in the case of ships, we can

find the maximum of this fraction, by drawing a tangent from the origin to the brake horse-power curve. The dotted line on Fig. 7 is tangent to the curve at about 70 miles an hour, at which speed a brake horse-power of 73 horse-power must be developed by the motor to propel the aeroplane. The effective horse-power re-

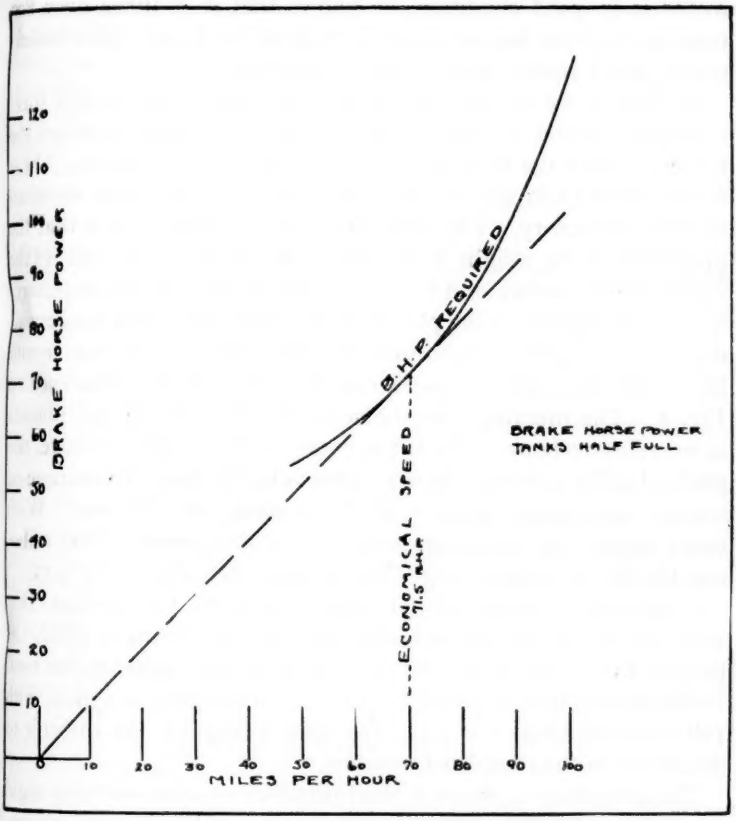

FIG. 7

quired for this speed is about 47 horse-power so the propeller is working at only 64 per cent efficiency. The duration of flight at 70 miles an hour is:

$$6 \times \frac{125}{73} = 10.25 \text{ hours},$$

and the total distance:

$$10.25 \times 70 = 717 \text{ miles}.$$

This compares with a radius of action at full power of six hours at 98 miles an hour, or 588 miles.

It is worth while again to point out the necessity of an air speed indicator. If the longest flight can be made at 70 miles, it is obvious that the pilot must adjust his speed to 70 miles. If his motor is in good condition, he knows that if it turns over 800 times per minute his air speed is 70 miles an hour. This indication is only a rough approximation, however.

In flight since the lift, head resistance, thrust and weight form a closed polygon of forces, the cutting off of power leaves the machine under the influence of weight, lift and resistance. These forces form a triangle of forces and draw the aeroplane along an inclined trajectory. The pitch or angle of glide is such that the projection of the weight on the line of the trajectory is equal to the resistance to motion, and the projection, normal to the trajectory, is equal to the lift of the planes in the same line. The tangent of the angle of glide is therefore the ratio between resistance and lift. The best gliding angle can be estimated by reference to Fig. 5. The minimum resistance with full tanks is 250 pounds at 65 miles an hour. The lift is equal to the weight. Hence, the pitch of glide is about 1 in 9.6. This is better than the average of modern aeroplanes where 1 in 8 is considered sufficient. With tanks empty, the minimum resistance is 205 pounds at 60 miles, and the lift or weight 1914. The glide is then about 1 in 9.35.

Experiments with a Bleriot monoplane at St. Cyr indicate that with power cut off and propeller turning idle during a glide, the propeller acts as a brake and in some cases may increase the total resistance as much as 20 per cent. This would give us a glide with full tanks of about 1 in 7.7. The gliding angle is not difficult to determine in the completed machine.

The aeroplane as above studied promises to meet our very rigid specifications and is worth proceeding with the detailed design. As the structural elements are designed the weight is determined carefully, and the speed and power curves corrected. When plans are complete, model tests of body and chassis with radiator and appendages will be made to verify the estimate of body resistance. Further correction of the characteristic curves can then be made, and if the results still promise success, the construction of a full scale aeroplane is undertaken. After extensive trials, the characteristic curves as calculated may be verified at a few points. For

this, it is necessary to measure propeller thrust in flight, together with speed and incidence.

The above aeroplane design then should have the following approximate characteristics:

Total weight, bare, 1598 lbs.
Oil and gasoline, 482 lbs.
Two men, 320 lbs.
Total weight loaded, 2400 lbs.
Area of wings, 400 sq. ft.
Wing loading in pounds per square foot, 6 lbs.
Type of wings, Eiffel No. 37.
Arrangement, staggered biplane.
Span, 40 ft. Depth, 5 ft. Aspect ratio, 8.
Gap between wings, 5 ft.
Length of body, 20 ft.
Motor: 125 horse-power Salmson (Canton Unné) (Type *M-9*, 9 cylinders, bore 120 mm., stroke 130 mm.).
Propeller: two-bladed, diameter 7.54 ft.
Type of propeller: St. Cyr No. 8.
Type of chassis: 4 wheels; steel tube.
Maximum speed, 98 miles an hour.
Landing speed: full tanks, 46.5 miles an hour; empty tanks, 41.5 miles an hour.
Radius at full power: 6 hours, 588 miles.
R. P. M. at full power, 1300.
Economical speed, 70 miles an hour.
Radius at economical speed: 10.25 hours, 717 miles.
B. H. P. at 70 miles: 73 horse-power, 800 R. P. M.
Theoretical best gliding angle, $\frac{1}{9.6}$.
Speed at best gliding angle, 65 miles an hour.
Initial rate of climb: full tanks, 650 ft. per min.; empty tanks, 928 ft. per min.
Horizontal speed of climb, 65 miles an hour.
Propeller efficiency at 90 miles, 80%.
Propeller efficiency at 70 miles, 64%.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE COMPILATION OF THE MANUAL FOR PAY OFFICERS AFLOAT

By PAYMASTER G. P. AULD, U. S. Navy

The scheme of the Manual for Pay Officers Afloat differs from that of most of the regulation and instruction books heretofore issued by the military services. This departure from accepted forms extends to arrangement of the subject-matter and physical appearance of the text, and is the result of an effort to provide an instruction book which would invite examination and, as a consequence, would be freely used. Literally, the word "manual" means "hand" book—a volume to be frequently thumbed over; and no book of facts will be freely referred to that will not, at short notice, divulge the desired information.

It has been a tradition that an official publication of exact instructions or citations shall follow the form of the statute books. The text is usually closely printed and unrelieved by any effective aids to the eye or to the understanding. The arrangement is often an inheritance from a time when administrative machinery was comparatively primitive, and, though perhaps once clear-cut and adequate, the subject-classification has long since broken down under the strain of absorbing unforeseen material. Neither alphabetical indexing nor alphabetical arrangement of topics has sufficed to remedy these defects, for the index item is well hidden in any copious index, the proper initial is hard to guess in a meager index, and connected study of related topics requires many separate excursions into the index and the constant use of bookmarks. A book of this sort is particularly balky when we are in a hurry, and we frequently dodge the issue and trust to a faulty memory that somewhere it says so and so.

It is possible that our respect for the law has deceived us into regarding the forms in which it is clothed as hallmarks of dignity and authoritativeness. In reality, they, of course, have no virtue apart from that of their subject-matter, and, as they are clumsy and unsuited for our purposes, we should do well to adopt other forms. Our instruction books should be convenient, practical tools of administration, designed for daily use. The grouping of the subject-matter under logical general heads and the breaking up of the text into clearly defined and plainly designated topics contribute to the usableness of such publications, and, in consequence, to more effective administration. In some cases, the amount of labor which would be required in preparing such an edition has perhaps been prohibitive, for in his endeavor to lay out the Manual for Pay Officers Afloat along these lines the writer found the task, though touching only one department of naval activity, to be a very exacting one.

The subject-matter of the Manual for Pay Officers Afloat was drawn from the statutes, the Navy Regulations, Treasury decisions and circulars, Bureau of Supplies and Accounts' circulars and instructions, Bureau of Navigation, Army and Marine Corps publications, and miscellaneous official sources. This mass of material was critically read, dissected and redistributed into subject-headings designed to meet the requirements of pay officers and of such others as may find such an angle of approach necessary or convenient. The classification finally adopted is mainly on functional lines. Its chapter and section headings are intended to be broad enough to absorb naturally the many citations requiring classification, and narrow enough to be mutually exclusive, so far as is possible in treating closely related subjects. In molding several thousand citations for the first time into a complete and connected treatment, it was necessary to fill many gaps—not by way of instruction, for we do not suffer from any lack of laws, regulations, and decisions, but by way of elucidation, somewhat as the telegraph editor of a newspaper supplies conjunctions and prepositions to the staccato messages that come in from his correspondents. To the interior arrangement of the sections many months' labor was devoted. Each paragraph was constructed with the idea that it must be a topical unit, precisely described by a heading in boldface type " run in " with the body; and cross references and page

headings were inserted to contribute further to the object in view, viz., the preparation of a self-indexing "hand" book.

The principal duties of an officer of the pay corps afloat are recognized as purchase and supply—the functions concerned with property—and disbursing (with its connected activities)—the function concerned with money. Property classifications and general regulations pertaining to supply are contained in Chapter IV, Supply. Chapter V is devoted to Purchase in general. Regulations pertaining to certain kinds of materials and systems of handling them, as well as specific instructions governing their purchase, are treated in Chapter VI, General Storekeeping System; Chapter VII, Provisions and General Mess; Chapter VIII, Ship's Store; and Chapter IX, Clothing and Small Stores. The functions concerned with money are treated, in general, in Chapter X, Money, which carries the subject as far as general instructions relating to claims and disbursements. Specific instructions of this nature appear in Chapter XI, Public Bills, and Chapter XII, Pay Rolls, the latter including statutes, regulations, and decisions governing pay, allotments, deposits, discharges, etc. The rendition of disbursing returns and their audit and settlement are treated in Chapter XIII. The topical sequence throughout is chronological, starting, for example, with procurement of stores, next taking up custody, survey, etc., and ending with disposition and accounting. In the appropriate chapters detailed instructions concerning specific materials are arranged alphabetically in a separate section.

Outside of the classification outlined above are general instructions relating to the status of the pay officer, contained in Chapter I; instructions pertinent to the pay officer as one of the several heads of ship's departments, contained in Chapter II; instructions descriptive of naval accounting and its general application aboard ship, contained in Chapter III.

Care is, of course, always necessary to protect the "Miscellaneous" department of any system from becoming a dumping ground. In the Manual for Pay Officers Afloat, this last chapter—XIV—embraces the following sections: 1, Instructions contingent on pay officers' status; 2, Instructions contingent on status of vessel; 3, Torpedo and other vessels not carrying pay officers; 4, Paymasters' clerks; 5, Bonds. Under the first two heads are gathered instructions, or references thereto, pertaining to special circumstances. The index clue arising in the mind is, in these cases,

more naturally associated with the special conditions which have prompted the inquiry than with the various functions involved. These sections relieve the major classification from the burden of too many variations, and furnish the inquirer with all the information desired when a particular situation arises, no matter what function is involved. Thus, paragraph 1263, on the pay officer "Entering Upon Duty Afloat," and paragraph 1291, on the vessel being "In Reserve," furnish information, or cross references, concerning the required procedure involved in the fields of storekeeping, general mess, money, etc.

Following the lead of the Navy Regulations of 1913, each chapter (and in this publication each section as well) begins on an odd page, thus obviating excessive reprinting when new leaves are inserted, and, to provide for additional topics, a gap is left in the paragraph numbering at the end of each section.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

UNE CHOSE A LA FOIS

By CAPTAIN T. W. KINKAID, U. S. Navy

Within the past year naval officers have been invited to give their views on naval personnel to a committee of Congress. In this way, and also through the medium of articles and comments printed in the U. S. NAVAL INSTITUTE PROCEEDINGS, officers have given expression to a variety of opinions as to measures which should be taken to improve the efficiency of the commissioned personnel.

It appears to me that it would be wise for naval officers to look over these expressions of opinion and to select therefrom a single proposition which gives promise of bringing maximum benefit to the naval service if enacted into law. Having selected such a proposition, concentrated efforts should be made to secure the favorable consideration of the Naval Committee, should that committee again invite expression of opinion from officers. The temptation to push other good propositions should be resisted; and no new idea should be taken up until after the adoption by Congress of the first proposition selected.

This is the slow but sure method of getting good organization and regulation of the naval personnel. The method requires years to secure a number of acceptable laws; but, on the whole, it appears to be better and more satisfactory than the series of failures which have resulted from attempts to secure the passage of complicated and all-comprehending bills. Better a tenth of a loaf than no bread!

It is true that in 1899 Congress passed a comprehensive personnel bill; but, in the first place, that happened some time ago; and, secondly, certain favorable conditions then existed that do not obtain at the present time. The legislative session of 1898-1899 followed a successful war, and the bill was passed ere the war spirit aroused by the conflict with Spain had subsided. Also there were great inequalities in the pay of naval officers, and practically no increase of pay for the various grades had been made for many

years; consequently the expedient of wording the personnel bill of that winter so that everybody would get an increase of pay was, to say the least, quite timely and attractive, and the result was that nearly every officer favored the bill.

Of ideas that have been advanced for benefiting the commissioned personnel none appeals to me more than that of "selecting up," by which plan all officers of a grade vote upon promotions from the grade below. This proposition appears in the December, 1913, issue of the U. S. NAVAL INSTITUTE PROCEEDINGS, in an article by Lieut. Commander D. W. Knox, U. S. Navy. Promotion to the grade of senior lieutenant in all corps should be by seniority. Above that grade promotion should be solely by selection—not the abhorrent kind of selection that we have heard about for years, which depended upon the will of one, or, at most, a few persons, but selection by officers of a whole grade.

Such selecting up should be done twice each year by mail vote, and promotions should follow twice yearly to keep the grades filled.

Promotion by selection involves age-in-grade retirement, and the proposed law should make proper provision for this.

I believe that a bill providing for "selecting up" with "age-in-grade" retirement would appeal to Congress and the service for the following reasons: First, the scheme would improve the efficiency of the commissioned personnel by giving promotion only to the most worthy; second, the duty of selecting would be incumbent on such a large number of individuals that private prejudices would not cut much of a figure; third, age-in-grade retirement, if properly regulated, need not be more expensive than the present system of retirement; fourth, the odious "plucking" system would be done away with.

There would not be a word in the bill about total number of officers required, pay of officers, amalgamation, or any other feature that would tend to attract attention from the main issue.

Selecting up and age-in-grade retirement might not appeal to more than a bare majority of the officers in the higher grades; but, I believe, officers of the other grades would generally favor the bill. Those who expected to be selected would, of course, favor the plan; of the others, doubtless some would be indifferent, and some would welcome the chance to retire and try for success in other fields of endeavor than the navy. I doubt that many would oppose the scheme.

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CORRECT FORM AND POSITION AND AIMING DRILLS

By CAPTAIN D. C. MCDOUGAL, U. S. M. C.

CORRECT FORM

In the preparation of men for work on the range, one point, the most important, seems to be entirely neglected. This is the "form," or technique of holding. In every game of skill, and in every manual art, a study is made of the position of the hands and body, which is imperative. Yet with the rifle this is perfunctorily passed over, too often, with a general explanation. The shooter is allowed to take any position he thinks proper, which is the wrong one, in nine cases out of ten. In this I do not mean that his position will be entirely wrong, but that he will in several points fail to take the position which is the best. His work in consequence is impaired. Motion studies of each position will show that there is a fixed position of the hands and body that gives maximum results. All others are less efficient. This position is in general not the one that a beginner will choose. In many cases it requires some patience and skill in making this position seem natural and comfortable.

The position and aiming drills, as laid down in the small arms firing regulations, do not cover the ground. As carried out they fail to do all that they should.

For instance, the prone position, the most useful, is the hardest to teach, and is left generally for the range. Drill grounds are generally dirty. Officers hesitate to give this drill when the men are in clean uniforms, as it dirties the clothes. Yet this drill is the most important of all, and should be held ten minutes daily, at least a month preceding the firing on the range. A month is none too long. Each individual must be taken in hand and trained until the correct position is taken each time. No other but the correct one should be permitted, however hard he protests that he can do better in another position.

Men are allowed latitude in the prone position, too often, on the ground that their arms are too short, or that they have rheumatism. They are allowed to shorten in and slide the left hand back under the balance. If persisted in, they could have easily taken the correct hold with their left hand out to the lower band.

Operating the bolt from the shoulder is another obstacle, which many men find difficult to overcome, but which is easy, if the proper form is followed. Here again will be heard the man with stiff muscles, and short arms. It will require some firmness to prevent the piece from being taken from the shoulder in order to operate the bolt. The reason here again is the failure to master the "form," without which, speed and facility in operating the bolt are impossible. For instance, if the right elbow is too far to the rear however good the position is otherwise, the firer will be unable to reach the bolt while the piece is in the shoulder. By moving the right elbow forward an inch or two it becomes easy. These drills are often left to instructors who have missed the vital points, and fail to instruct. When the men arrive on the range they are so badly grounded in the fundamentals of firing that a much longer time is required in their instruction practice.

The time that can be spared on the range for the individual is too short at best, as the exigencies of the service in the marine corps do not permit men to be absent from their stations for an extended period of time.

Much of the time is generally taken in instruction that should have been given at their home stations weeks before being sent. One week is not sufficient, nor two. The instruction in the positions should be a part of the daily drills for more than a month preceding range practice.

The sighting drills are easily taught, and once understood are not forgotten. A man quickly sees and understands the principle of sighting, and once understood, no more instruction is necessary. But the position, being a manual training, must be carried out systematically, until a high degree of dexterity is attained. The muscles must be trained, so that the *correct position* is the only comfortable one.

We spend hours teaching this same thing with the manual of arms, until uniformity and precision are attained, and all through a man's service this is kept up. But with the firing positions, little or no attention is paid, beyond a general hit or miss plan. This

allows hundreds of variations of the hands and body, to suit each individual's conception of what is proper. It seems in some cases, that if the rifle is pointing in the direction of the target, the conditions of instruction are fulfilled.

The first exercise consists in taking the prone position, adjusting the sling and snapping a few shots at marks, great care being taken in getting the position correctly from the beginning. After this is mastered, the men should be practiced in getting up and lying down, taking the prone position. The next step is operating the bolt from the prone position without removing the rifle from the shoulder. Finally, when all are proficient in this, the regular exercise of taking the prone position and snapping five shots at a mark in 20 seconds should be commenced and carried out each day, until the men go on the range.

This same procedure should be taken with all other positions, after the prone one is mastered, but the prone must be continued with the others, so that when the men go on the range, they will be in prime condition. This leaves the coaches free to devote all their time to the subjects that properly belong to range training. Therefore no delays on the firing point will be caused by the improper handling of the piece.

Gallery practice instruction in sighting, and the rules for elevation and windage should be carried out as well. But the position exercises fill the gap that is not covered by either of these useful forms of instruction.

The cooks and messmen, who do not get this exercise, will be far behind the other men, although they had received plenty of gallery instruction. They will lack the manual dexterity, and most of the failures to qualify will be from these men.

While not a part of this subject, flinching is the only thing that cannot be prevented or overcome without days of shooting on the range. All beginners and many men throughout their service flinch. In fact, many qualified men flinch but not sufficiently to take them off the target. This flinching is the bane of shooting. It seems inherent in every man, and can be overcome only by patient coaching and striving on the part of the shooter. This limits the speed in which the individual can be put through the course of instruction and record practice, for until this is overcome no progress can be made. There is a limit to the number of shots that can be fired each day without increasing instead of diminishing this fault. Still I believe, that the position drills do help this in a

small degree by hardening the muscles and preventing the firer from being hurt by the kick of an improperly held piece.

This set of drills embodying these ideas will be of great assistance in the preparation of men for the range or for field firing. If made one of the garrison drills to be held at least three times a week during the spring, and oftener during the month preceding target practice, a larger percentage of qualifications will be the result, with less time employed actually on the range.

To be successful, however, the "correct form" should be the basis of these drills, and should be striven for, first, last, and always.

POSITION AND AIMING DRILLS

FIRST EXERCISE

The squad being deployed to two paces, sling properly adjusted as to length, and ready to place on arm.

FIG. 1

"*Prone Position.*"—Each man half faces to the right, slips left arm through sling, high up on arm and tightens with keeper, grasps piece with left hand against lower band, kneels with right hand outstretched and lowers body to the ground, lying at an angle of about 45 degrees, left elbow extended to the front, as far as can be reached, and well to the right, butt of piece on the ground, barrel up, right hand at the small of the stock, grasping locking piece between thumb and forefinger, ready to unlock piece (Fig. 1).

POSITION EXERCISE

(1) Unlock the piece, slide right hand back to butt with palm against butt plate, raise right shoulder and place butt in position (Fig. 2), slightly rolling body to the left.

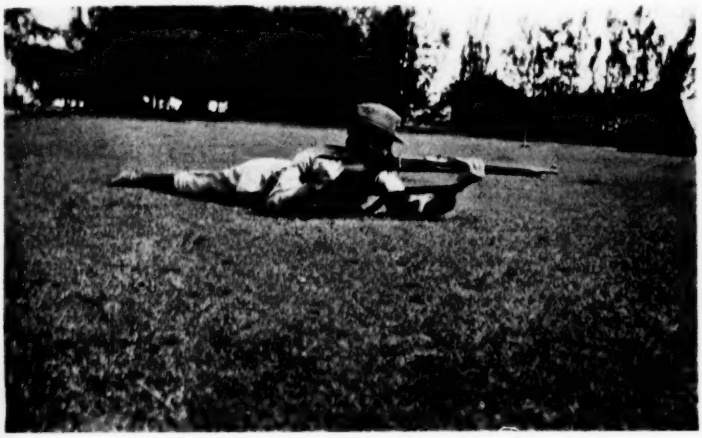

FIG. 2

(2) Slide right hand forward to small of stock, right forefinger around trigger, at second joint, so that the tip of the finger

FIG. 3

touches the stock on left side, right elbow to right and well to the front, so that the hand can reach well forward of the bolt with ease (Fig. 3).

(3) Align sights on object, and when piece is steady, squeeze trigger until firing pin is released.

FIG. 4

(4) Grasp bolt handle between thumb and forefinger, completely surrounding the knob with forefinger, thumb uppermost (Fig. 4), turn the piece to right with left hand, lowering the

FIG. 5

muzzle with a quick rolling motion, and draw back bolt to rear quickly (Fig. 5), close bolt and assume the first position.

Four counts are given in this exercise in order that the instructor may easily explain the numerous details and see that all are carried out correctly before a new position is taken. Care should be exercised in having the slings of proper length, so that when the left hand is as far forward as the lower band, will permit firm pressure exerted by the sling against the shoulder (Fig. 11). Unless the left elbow is stretched well to the front, the tendency will be to point the piece downward and the beginner will be unable to aim as high as the target (Fig. 7). He will attempt to slide his left hand back to remedy this defect (Fig. 10), but should not be allowed to do so. By sliding the elbow farther forward and lowering the right shoulder, the muzzle can be raised to the necessary height. This is the hardest point in the exercise, and is the basis of the correct position. Poorly instructed men invariably have their hands far back from the proper place. The second difficulty will be found in reaching the bolt handle while the piece is in the shoulder. This is caused by the incorrect location of the right elbow, which is generally too far to the rear (Fig. 8). By sliding it farther to the front this trouble disappears, and new men with very short arms can work the bolt with ease. The quick rolling motion to the right, given by the left hand, gives a leverage to the right in overcoming the first motion of reloading the piece. This knack comes easily, once understood, and is of great importance in rapid fire.

RAPID FIRE EXERCISE

(1) Execute the first and second positions of the prone position exercise; (2) Align the sights, and without undue deliberation pull the trigger, operate the bolt rapidly, as in fourth position, four times, keeping the piece in the shoulder.

In this exercise the men should be taught to fire slowly, to take careful aim, and as soon as the piece is fired, to operate the bolt, going through the loading motions as rapidly as possible, emphasizing the fact that every second gained in loading leaves so much more time to be utilized in sighting, which should always be carefully done.

These exercises teach the men to fall in the positions quickly and correctly, and to operate the bolt with all the speed that can be desired. In fact these positions have proved to be the fastest positions. They improve rapid fire and skirmishing, and are

applicable to the new firing regulations (1914), as well as those now in force.

Men instructed thoroughly in the above, do not experience difficulty in loading during a skirmish run, nor do they have difficulty in getting off all their shots within the time limit, in timed, or rapid fire.

The average man has little difficulty in becoming proficient quickly, but in every hundred men there are from four to ten who, for various reasons, have much trouble in overcoming the difficulties of all the positions.

These are due to stubbornness, stupidity, being muscle bound, poor condition of muscular system, and old age. But by persistence, all can be taught and the results on the range are well worth the extra time and patience expended.

INCORRECT POSITIONS AND THEIR REMEDIES

Sling not properly adjusted and not placed high enough on arm, and allowed to slip down on elbow. Provides little or no support. A common error with beginners (Fig. 6).

FIG. 6

Left elbow too far to rear. This does not permit of proper elevation of the piece, making it impossible to point up as high as the target. By sliding the left elbow about 3 inches farther to the front remedies this fault. But some practice is necessary in some

cases, before all stiffness of the arm disappears and the position becomes comfortable (Fig. 7).

FIG. 7

Right elbow too far to rear. Impossible to operate the bolt from shoulder, as the hand cannot reach the bolt. Also trigger finger cannot reach to proper position around the trigger. Remedied by sliding elbow forward, until bolt handle is easily reached. It may

FIG. 8

be necessary to lengthen sling as this tendency is partially due to too tight a sling (Fig. 8)

Piece not resting in palm of hand, but on fingers, causes unsteady hold and tends to cant as wrist becomes tired (Fig. 9).

FIG. 9

Incorrect position of left hand and most common fault.

Left hand slid back to take up slack, in improperly adjusted sling. Increases leverage of muzzle of rifle for lateral unsteadiness, raises

FIG. 10

body too high on both elbows, and gives uneven "jump," due to frequent changes in the exact location of the hands (Fig. 10).

Fig. 11 shows the correct position.

FIG. 11

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RADIO ACTIVITY[1]

By ENSIGN L. R. FORD, U. S. Navy

The basis of the phenomena of radio-activity is the discovery of Becquerel rays in 1896, by the physicist of that name. The discovery by Roentgen of X-rays caused scientists to wonder if the property of emitting rays that would penetrate solid matter was not associated in some way with phosphorescence. Niewenglowski discovered that calcium sulphide, which is phosphorescent in the dark after having been exposed to the sun, emitted some sort of light waves that would penetrate an aluminum plate and effect a photographic plate. Becquerel, while experimenting along the same lines, discovered that the metal uranium emitted rays that would act in the same way. The significant feature of his discovery, however, was that the substance did not have to be exposed to the sun before it emitted these rays. Thus the rays emitted were not due to the rays of the sun, but were manufactured by the body itself, within itself. Moreover, the body did not lose this property. The original piece of uranium used by Becquerel in his experiments still retains its activity. Here then was a new property; that by which a chemical substance, in its normal condition, having no relation to light, emitted rays that would penetrate solid matter. This new property was called *radio-activity*.

At first it was thought that the source of this radio-activity was the metal uranium itself, but during the researches of Professor and Madame Curie they investigated the pitchblende, the substance from which the metal uranium is extracted, and discovered that a specimen of it possessed four times as much activity as uranium.

[1] An essay delivered before the Post Graduate Department, U. S. Naval Academy.

Continuing their investigations, they succeeded in extracting three substances with wonderful ray emitting power: radium, polonium and actinium. Of these radium was the most easily extracted and it was found to possess ray emitting powers 100,000 times as great as uranium.

Radium, as an element, has never been isolated. It has been extracted only in combination with some salt-like chloride or bromide. That it does exist as an element is proven by the fact that it has a spectrum of its own. Every element is identified by its spectrum. From a specimen of pure radium chloride a spectrum was obtained that was like that of no other element known.

It is only with enormous difficulty that radium is extracted from its parent substance, pitchblende. The residue from the ore is sent to the Curie Works and after a long process of precipitation and crystallization a few grains of impure bromide or chloride of radium is obtained from about a ton of the material. This impure product is then separated from the barium, with which it is mixed, by a slow process of crystallization. The separation of the two substances is rendered possible by a very slight difference in solubility. The degree of separation is indicated by the increased ray emitting power of the radium. At the beginning it has a power 2000 times as great as uranium, and when the process is completed this power has increased to 1,300,000 times as great. When this point is reached, however, there remains only about a hundredth of a gram, from a ton of the material.

The early investigation of the power of the Becquerel rays from radium to penetrate solid matter showed that the kind of solid substance used had no effect on this power; it was only effected by density. Lead, being very dense, is comparatively opaque to the rays.

It was also found that the rays could be used to take photographs in the same way that the X-rays are. The rays have the property of rendering many substances phosphorescent. The diamond and the ruby will shine out brightly if exposed to the rays from a tiny bit of radium. The rays will also act to cause painful sores if the skin is exposed to their action. That they have the property of rendering the air a conductor of electricity is proven by a simple experiment. The leaves of an electroscope are spread apart by an electric current, then if a small tube containing a bit of radium

is brought near, the leaves will discharge their electricity and collapse. The rays have a very marked chemical action on numerous substances.

The discovery of the numerous properties enumerated above led to further experiments in an effort to find out just what these Becquerel rays were. Becquerel himself discovered the key to their nature by experimenting with a powerful magnet to see if they could be bent aside from their straight path. By his experiments, and those of other investigators, it was found that the rays could be analyzed into three distinct kinds of radiation, viz:

(1) The *Alpha-rays.*—These have very little penetrative power and are only slightly bent by the strongest magnetic force.

(2) The *Beta-rays.*—These are very penetrating and are easily bent aside by a weak magnet, but in the opposite direction from the alpha-rays.

(3) The *Gamma-rays.*—These cannot be bent in the slightest by even the strongest magnets, and they have a most remarkable penetrative power.

Having separated these rays it is now in order to find out just what each kind of ray is.

Alpha-rays are found to have the same properties as positive ions.

Positive ions have been identified as tiny bodies, positively electrified, that shoot off at high velocity from various bodies under certain conditions. The alpha-rays are found to be identical with these ions, but instead of requiring these certain conditions, such as high temperature, for their release, they pour off in a constant stream from radium in its natural condition. By means of a little instrument called the *spinthariscope* the effect of this stream of rays can be seen. It is a small tube, having a zinc sulphide screen at one end, a minute particle of radium salt suspended in front of the screen, and fitted with a magnifying eyepiece. When we look through the eyepiece into this tube, in a dark room, we can see thousands of little flashes on the screen, each one caused by one of the atomic projectiles from the alpha-rays striking the zinc sulphide and splintering off a fragment of it. This stream of tiny projectiles pours out of the radium year in and year out, without any sign of diminution.

The beta-rays have been most widely studied, because of their extraordinary powers of penetration and their property of render-

ing bodies phosphorescent. It has been determined that these rays are corpuscles, just like the ones given off by candle flames or Crookes tubes, but they travel at the tremendous velocity of 100,000 miles per second. Their other strange properties are: they pass right through all ordinary bodies; they are charged with negative electricity; they render bodies phosphorescent; they make the air a conductor of electricity; they effect a photographic plate; they cause clouds in moist air; they cause chemical action, and they have a peculiar effect on the human body.

The gamma-rays are not so well known as the alpha- and the beta-rays. Their most noticeable property is their power of penetration.

They will go through a foot of solid iron, or through several inches of lead. They are still a somewhat unknown quantity, but their similarity to X-rays leads to the conclusion that they are X-rays generated by the beta-rays by their "back kick" as they leave the radium.

From the foregoing it is seen that the alpha-, beta- and gamma-rays are identical with the previously known ions, corpuscles and X-rays. But here is the wonderful difference—the ions, corpuscles and X-rays arise from substance only under special conditions, while the alpha-, beta- and gamma-rays, which constitute the Becquerel rays, are emitted by a substance in its natural condition, just as dug from the earth, and the power of emitting these rays will apparently remain undiminished during the centuries. It is this property that we call *radio-activity*.

After considering the three different kinds of rays emitted by radium, we now come upon another strange and interesting property. The Curies, in their experiments with radium, discovered that it possessed the property of inducing radio-activity in other bodies brought near it. Everything near it—the air, the laboratory fittings, the clothing and even the bodies of the workers—became radio-active and gave out rays that would effect a photographic plate or discharge electricity. This induced radio-activity was found to be only temporary, and died out after its cause was removed. At first it was thought that radium induced this activity in nearby bodies in the same way that a magnet induces magnetism in iron that is brought near it. This idea was found to be wrong, and the Curies found out by a simple experiment that it was caused by something like a gas that was given out

by the radium. It was not positively identified as a gas, so it was called an *emanation*. Ordinarily this emanation is confined within the body of the radium and is being continually diffused, settling on all nearby objects. If the radium salt is dissolved in water a great mass of this emanation, stored within the radium, is released and it can be collected by bubbling air up through the solution. If this emanated air is passed over red hot plates of various materials its ray emitting power is unaltered. If the air is placed in a glass vessel and subjected to a temperature of 150° C. below zero the emanation will condense in a brilliant phosphorescent patch on the side of the vessel. The emanation gives out only alpha-rays and the radium, after the extraction of its emanation, has lost 75 per cent of its activity. The rays it still emits are alpha-rays. Now we come to a most remarkable fact. In about a month's time the emanation completely loses its activity, while the radium has completely regained its activity, the emanation losing activity at exactly the same rate that the radium regains activity. This leads to the conclusion that the radium is constantly generating and storing up emanation at the same rate that the emanation decays. This process goes on, no matter in what form the radium may be, and it cannot be stopped or changed in any way by any known means. We are forced then to the conclusion that the very atoms of radium are breaking down into atoms of emanation, while the atoms of emanation are breaking down into some other substance. This then brings us face to face with the fact that the old theory of the indestructibility of matter is wrong—we are in the presence of the destruction of old and the creation of new matter.

Curves of the decay of emanation activity have been plotted and it has been found that the activity falls to half value in 3.7 days. From this it can be computed that the emanation stored up in the solid radium is 463,000 times as much as that formed per second. This stored up quantity can be liberated by the method of solution previously described and the amount liberated can be measured by means of the electroscope. Actual tests made in this manner have shown that the amount stored in the solid was just 477,000 times that afterwards developed per second. This is seen to agree very closely with the theoretical ratio.

After it had been determined that the induced radio-activity was due to the emanation further investigation showed that this

property of inducing activity in other bodies was due to the fact that the emanation broke down into a third invisible and unweighable substance which deposited on nearby bodies, and which possessed activity. This substance was given the name *emanation X*. It possesses definite chemical properties and can be dissolved by certain acids, and not in others. If the acid in which it is dissolved is evaporated the emanation X will be found to be left, with its radio-activity unaltered. It can be volatilized at white heat and re-deposited on cold bodies, making them radio-active. That this substance is not the emanation itself is proven by the fact that its rate of decay is different from that of the emanation. It has been previously noted that only alpha-rays came from the emanation or from the radium after the removal of the emanation. The emanation X, however, emits beta- and gamma-rays, and is evidently the source of the beta- and gamma-rays that are emitted from the solid radium. It emits alpha-rays, as well as the beta- and gamma-rays, so it is likely that it breaks down into two other forms that emit the beta- and gamma-rays. No scientific means are yet available, however, by which these other forms can be studied.

From the foregoing it is seen that the solid radium compound gives out energy in the form of alpha-, beta- and gamma-rays. Of this energy 25 per cent cannot be separated from the radium, and consists of alpha-rays only. The other 75 per cent is contained in the emanation, and, of this, 18 per cent belongs to the emanation itself, and consists of alpha-rays, while the remaining 57 per cent belongs to the emanation X and its final products, and consists of beta- and gamma-rays. In the radium compound, then, are the three bodies, and the total activity of the radium is due to the balance of the activity of the three. Now the question arises, what is the final product from the successive breaking down of the atoms of radium, emanation and emanation X?

Twenty-five years ago a new element was discovered by Sir Norman Lockyer, in the gas surrounding the sun. To this element he gave the name *helium*. Twenty years later Sir William Ramsey found that it was a constituent of certain minerals on the earth. It developed that it was associated, on earth, only with radio-active minerals. This suggested the thought that this gas, helium, was a product from the disintegration of the radium atoms. This speculation was made almost a certainty in 1903 by the discovery of the spectrum of helium in air that has been bubbled through a

radium solution and allowed to stand for some time. It is as yet unknown whether the helium gas is the final product of the disintegration of radium, or a by-product from the emanation.

While radium is the best of all the radio-active elements, there are four other elements that are radio-active. They are thorium, uranium, polonium and actinium.

Thorium is a constituent of the common Welsbach gas mantle. Its radio-activity is very small compared to radium, but it gives off the same alpha-, beta- and gamma-rays. Its activity is not constant like that of radium, but can be separated out chemically. If thorium is dissolved in water its activity can be separated out by ading ammonia to the solution. The thorium will be precipitated as a solid and its activity will remain in the water.

If now the water be evaporated a small quantity of very active matter will remain. In a month's time this matter will completely lose this activity while the thorium will regain it. In this respect it is seen to be like radium.

Uranium goes through a like process of decay and restoration, but it does not give out emanation X, consequently it does not cause radio-activity in bodies near it. Polonium has been extracted from pitchblende, but in such minute quantities that little has been discovered as to its qualities. It will cause a diamond to shine brightly and will ring an electric bell if brought near it. Actinium resembles thorium but is many thousand times more active. Only a very minute quantity has been extracted.

Radio-activity is not confined to these five elements but exists to a minute degree everywhere—in the air, in rain, in snow, in certain waters, and in many common substances. It is probable that the curative properties of certain medical baths is due to the radio-activity in the water or the mud. Whether this radio-activity is due to the presence of minute particles of the radio-active elements, or whether it is the natural property of all matter to emit rays, is a question that the future may decide. Radio-activity seems to offer a most fascinating field for study. As the amount of radio-active elements available for study and experiment becomes larger, who can predict what wonderful and startling discoveries will be made! The possibilities are indicated by the joking remark of Professor Rutherford to the effect that if he had a suitable detonator he could start a disintegration of the atoms that would destroy the whole world and leave behind only a mass of helium gas.

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THE TORPEDO ON CAPITAL SHIPS

By Romeo Bernotti

Translated by Lieutenant Thomas Withers, Jr., U. S. Navy

(From *Rivista Marittima* of September, 1913)

In the book entitled "Fondamenti di tattica navale" (Foundations of Naval Tactics), published in 1910, treating of the question of radius of action of the torpedo, we came to the conclusion that, with the ships of that day, at a range of over about 3500 meters, the use of the torpedo could not be ignored, but this use became advantageous only under such conditions that maneuvering had to remain entirely subordinated to the use of the gun. This conclusion was based upon ships armed with few torpedo tubes; at that time I laid stress upon concentrating more torpedoes against the same ship and upon firing torpedoes against a fleet of ships upon the hypothesis that each ship would make a single launch or, in other words, would be able to launch but one torpedo at a time.

The idea of arming the battleships with numerous long-range torpedo tubes now seems to be making way; for this reason we believe it opportune to discuss the importance of the torpedo on the hypothesis that each ship be able to make a multiple launch; we will proceed in the following order:

1st. Study of the probability of hitting with the single launch and with the multiple launch for the various angles of impact.

2d. Search for the most convenient method of making the multiple launch.

3d. Conclusions, upon the influence upon naval tactics, that can be predicted.

We propose to show that, even giving to the torpedo all the advantages that are nowadays admissible, these can easily be neutralized and that the gun still is the predominating arm of naval battles.

PROBABILITY OF HITTING

We will take a torpedo of 9000 m. run at 25 knots, and we will suppose that it combines the qualities that the French have sought in two distinct types of torpedo ("torpille-distance" and "torpille-vitesse"); we will then admit that by decreasing the run we can get greater speed, according to the ratio that we established in the book cited.

In the issue of this *Revista* of last May, Sub-Lieutenant Iachino made an interesting study of the probability of hitting with a single launch, and in its application to the above-mentioned torpedo, assuming the launch to be made against a ship 200 m. long at 18 knots speed, he has made a table of probability that is very favorable to this arm. It must be observed, however, that (though he may have made allowances) he took it for granted that he can limit the errors in the course and in the speed of the target to 5° and 1 knot respectively, supposing that these are determined from two sets of simultaneous bearings and ranges. We hold that when in offensive contact it will not be possible to obtain such accurate results; in fact, two adversaries will maneuver at long range and, though the course may change slowly, it is necessary to take the elapsed time of the torpedo's run into account, as in the following table:

Run in meters.....	3000	4000	5000	6000	7000	8000	9000
Time of run in sec.....	130	211	290	387	483	592	708

Se we think it optimistic, for the torpedo, to assume a mean error of $\pm 10°$ and ± 2 knots in the course and speed of the enemy, respectively; with this value, supposing that the weapon is perfect in itself, we have drawn the curves of 50 per cent probability of hitting, on the hypothesis of a ship at 18 knots.

These values are used in the following table, which we consider valuable because it serves as a basis for the calculations to which we shall refer later on; in this table c is the run and i is the angle of impact,[1] taken from the bow of the target.

[1] Let t be the time of the run, ϵ and ΔV_N the respective errors in the enemy's course and speed; then the resulting errors s_ϵ and s_V are given by the formulæ:

$$s_\epsilon = V_N t \left[\frac{\sin i}{\sin (i - \epsilon)} - 1 + \frac{V_N}{V} \frac{\sin \epsilon}{\sin (i - \epsilon)} \right],$$

$$s_V = t \Delta V_N.$$

TABLE I

CURVES OF 50 PER CENT (METERS)

i \ c	3000	4000	5000	6000	7000	8000	9000
30°	1005	1740	2420	3420	4400	5600	6900
60°	420	760	1090	1500	1880	2400	2950
90°	260	440	630	880	1270	1470	1820
120°	229	360	495	651	830	1027	1280
150°	385	630	790	961	1100	1270	1420

From this table, assuming a ship 200 m. long, we get another, as follows:

TABLE II

PERCENTAGE OF SUCCESSFUL HITS IN THE SINGLE LAUNCH

i \ c	3000	4000	5000	6000	7000	8000	9000
30°	11?	6	4	3	2.5	2	1.5
60°	25	14	9.5	7	5.5	4	3.7
90°	39	24	17	13	9	7	6
120°	45	29	21	16	13	10.5	8.5
150°	27	17	13	11	10	8.5	6.5

The probabilities of hitting appear remarkably less than those deduced in the article referred to, but, admitting, as is logical, that the practical probabilities will always be considerably less than the theoretical probabilities, this table goes to show that, in the multiple launch, the probabilities of hitting will be much greater.

* * *

As is noted, in the multiple launch of torpedoes from one ship at the same target, the acknowledged offensive ability of the weapon helps to show that the torpedoes have slightly different errors with respect to the center of the target; the torpedoes ought to be launched so that they will form an *unbreakable chain* across which the enemy's ships may not pass without being struck. Not stopping to consider the method by which such an objective can be attained with the installations on the battleships, we will make some deductions for easily determining the probability of hitting. Firing a torpedo at a target whose length is L, in order to hit the ship the error must be less than or equal to $\frac{1}{2}L$. If a multiple launch of two torpedoes is made, the maximum error from the

center of the target, so that the ship will still be hit, is L; with three torpedoes this error can be $\frac{3}{2}L$; and, in general, for n torpedoes the error can be $\frac{n}{2}L$. This makes it evident that *the multiple launch of n torpedoes, with a dispersion L between each two successive ones, has a probability of hitting equal to the probability of one torpedo fired at a ship of the length nL.*

The probability, such that the multiple launch of n torpedoes may give a useful result, is then picked out of the table of the factors of probability, taking for the argument the factor $\frac{nL}{E}$ (where E is the curve of 50 per cent given by Table I) in the same way in which we took, for the argument in the single launch, the factor $\frac{L}{E}$. The percentage P that we thus obtain shows that in N salvos there will be, theoretically, $\frac{NP}{100}$ salvos in each of which a torpedo will hit the target.

We get, in this way, the following tables for the case of salvos or three or six torpedoes.

TABLE III

PERCENTAGE OF USEFUL SALVOS IN THE MULTIPLE LAUNCH (3 TORPEDOES)

i \ c	3000	4000	5000	6000	7000	8000	9000
30°	21	18	13	9	7	6	4
60°	48	40	29	21	17	13	11
90°	70	64	48	37	25	22	17.5
120°	76	74	59	46.5	37	30.5	25
150°	52	48	39	32	29	25	23

TABLE IV

PERCENTAGE OF USEFUL SALVOS IN THE MULTIPLE LAUNCH (6 TORPEDOES)

i \ c	3000	4000	5000	6000	7000	8000	9000
30°	41	36	26	16	14	11.5	9
60°	80	69	54	41	33	26	21.5
90°	96	93	80	65.5	47.5	42	34
120°	98	97	89	78	66.5	56	47
150°	84	80	69.5	59.5	54	47	43

* * *

In order to have the ideas well fixed in regard to the way the probabilities of hitting vary under different conditions, we refer to the elements that guide us in tactical maneuvers, in other words, to the range between the adversaries and to their relative bearings. From the arguments c and i (run of the torpedo and angle of impact) we pass to the arguments r and γ, r being the distance between the adversaries at the moment of the launch and γ being the angle that the line joining the centers of the formations of the two adversaries makes with the course of the target ship. This change of co-ordinates can be made by means of the following table where the values of c and i (in parenthesis) corresponding to value of r and γ are given:

TABLE V

VALUES OF c AND i

γ \ r	3000	4000	5000	6000	7000	8000	9000	10000
30°	2300 (41°)	2900 (44°)	3600 (44°)	4250 (45°)	4800 (47°)	5350 (48°)	6059 (48°)	6600 (49°)
60°	2650 (80°)	3500 (84°)	4350 (87°)	5200 (90°)	6100 (93°)	6950 (95°)	7859 (95°)	8700 (98°)
90°	3400 (118°)	4700 (121°)	6350 (128°)	8050 (132°)	9900 (135°)	.....	.....	.....
120°	4800 (147°)	8200 (155°)	11550 (158°)	.....	.....	.....	.....	.....
150°	7200 (168°)	12850 (171°)	.....	.....	.....	.....	.....	.....

In this table γ varies between 30° and 150° on the hypothesis that the enemy may bring the launching ship to bear in the sectors of her maximum offensive gun power; no limitations for the angle of impact are established because we assume that the torpedoes launched are furnished with a firing pin that will work at any angle. We have underlined the values of the run which are not much greater than 9000 m. in order to preserve the form, but we have naturally thrown out the values that are very much greater than 9000 m.

In the first place, the above table gives an idea of the *possibility* of the launch, either single or multiple, independently of the

greater or smaller probability of hitting indicated by Tables II, III and IV. The gist of this table can be memorized as follows:

TABLE VI

LIMITS OF POSSIBILITY OF THE LAUNCH WITHIN 10,000 M. RANGE

γ	Limits of r
30°	always
60°	always
90°	6500
120°	4200
150°	3300

In addition, Table V makes it possible to deduce, from Tables II, III and IV, the probabilities of hitting corresponding to r and γ, or to obtain the two following tables:

TABLE VII

PERCENTAGE OF USEFUL LAUNCHES IN THE SINGLE LAUNCH

γ \ r	3000	4000	5000	6000	7000	8000	9000	10000
30°	22	17	13	9	8	7	5	3.5
60°	38	29	21	16	12.5	9	8	7
90°	39	23	14	9	..	..	..	..
120°	14	8	..	..	..	..	..	..
150°	7	..	..	..	..	..	..	..

TABLE VIII

PERCENTAGE OF USEFUL SALVOS IN THE MULTIPLE LAUNCH (6 TORPEDOES)

γ \ r	3000	4000	5000	6000	7000	8000	9000	10000
30°	60	60	56	49	44	40	30	28
60°	92	91	84	77	64	50	46	40
90°	97	90	69	53	..	..	..	..
120°	74	44	..	..	..	..	..	..
150°	41	..	..	..	..	..	..	..

* * *

We have been considering the probability of hitting a particular ship; now we ask ourselves if the target of two or more successive ships can be considered alone, that is, without successive solutions.

The target of two or more ships is equivalent to a continuous fictitious target with respect to the course of the torpedo if it is not possible for the torpedo to cross the line drawn through the two ships without hitting one of them, that is, if a miss happens only when all the ships of the formation are on the same side of the course of the torpedo.

In the case of stopped ships this continuity would be true with respect to torpedoes coming from the sectors of the formation's minimum offensive power, that is, from those that are obtained by joining the opposite ends of the contiguous ships. In the case of moving ships the continuity of the target corresponds to the sectors which comprise the trajectories for which the above-mentioned lines joining the opposite ends of the contiguous ships represent the relative torpedo-target motion. In the single launch these sectors are restricted, and so the launch made, considering a formation as a single target, has a small probability of hitting.

For the multiple launch of n torpedoes it would be possible to make, in this way, an examination of the limits within which more ships can be considered as a single target, substituting, for the ships of length L, some fictitious targets of the length nL; we will confine ourselves to observing, although it has been said before, that two or more ships, 200 m. long, in column, and if they are 500 m. apart, form a continuous target for a multiple launch of six torpedoes. In fact, in such a case the fictitious targets overlap so as to form one continuous target.

Since, in this study, we assumed that the torpedo had all possible advantages, we will admit that with respect to the multiple launch the target is always continuous, for all formations nearer to column than to line.

* * *

From what we have said above we can arrive at the following conclusions:

1st. A ship can be considered in condition to launch, with a single launch or a multiple launch, when the target keeps her in the sectors of maximum offensive power of the guns (γ = from 30° to 150°), only if the range is within the limit of about 3000 m. At ranges greater than about 5000 m. a ship will be able to launch only in case the enemy keeps her forward of the beam (see Table VI).

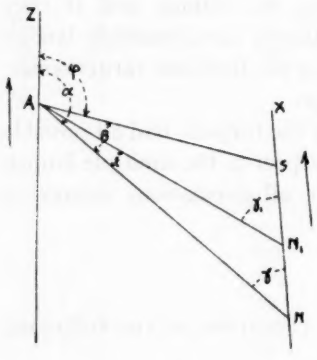
2d. The probability of hitting with the single launch (taking into account that the practical probability will be less than the theoretical probability) can be considered up to ranges of about 5000 m. if the target keeps the launching ship forward of the beam and not too far away (γ = between 60° and 90°). This deduction, which we obtain from Table VII, together with what precedes, forces us to the conclusion that the single launch at ranges greater than 3000 m. will be exceptional. Above ranges of about 4000 m. it is safe to maneuver, against ships that cannot make a multiple launch, without considering the torpedo.

3d. The multiple launch gives great probabilities of hitting. This fact gives rise to the question: What difficulties does the execution of the multiple launch present?

EXECUTION OF THE MULTIPLE LAUNCH

A satisfactory solution of the problem of the multiple launch in salvo cannot be actually worked out in practice with submerged torpedo tubes.

We will consider the single triangle of launching ANS (see figure), N being the mobile point struck by the trajectory AS of the torpedo, and AZ and NX the courses. α indicates the relative bearing ZAN and ϕ is the angle of the launching tube from the bow, and β is the angle of sight SAN.



In the case in the figure, where the adversaries head in the same general direction, we have

$$\phi = \alpha - \beta,$$

and when they head in opposite directions,

$$\phi = \alpha + \beta.$$

For the multiple launch on the basis of the ratio

$$\sin \phi = \frac{Vn}{V} \sin \gamma,$$

the angles of sight $\beta_1, \beta_2, \beta_3, \ldots$ would have to be calculated in functions of the relative bearings $\gamma_1, \gamma_2, \gamma_3, \ldots$ corresponding

to the dispersion that we wish to obtain in the salvo. So, for example, to obtain the error $s=NN_1$ with respect to the mobile point N, indicating by γ_1 the angle AN_1X and by ϵ the angle N_1AN, we have

$$\gamma_1=\gamma+\epsilon,$$

where ϵ can be found from the triangle N_1AN in functions of s, of γ and of the range $r=AN$, also taking into account the distance between the launching tubes. Having deduced the angles of sight the problem would be solved if the torpedo tubes could be trained as easily as guns; but if this is true of above-water tubes, it must naturally be thrown out in the case of submerged tubes.

We cannot count upon continuous aim, so the solution that we seek is for *clamped tubes*, giving to the tubes the angles of train ϕ_1, ϕ_2, ϕ_3, ..., to be found from the above-mentioned ratios. But with submerged tubes the angle of train is fixed; therefore, in order to put into practice a solution of the kind indicated above, two methods present themselves: 1st, to have the tubes installed in conveniently divergent directions; 2d, to have the tubes parallel but equivalent to tubes that can be trained, the torpedoes being equipped with (guidasiluri) outside gyrosetting devices.

The first of these methods cannot be adopted because, since the tubes will not train, their divergence cannot satisfactorily correspond to the variation of the range of the enemy and of his relative bearing; in other words, we cannot adopt an average solution.

As for setting the gyroscope, even admitting that it works perfectly, it is clear that this cannot be as good as continuous train; in fact, the torpedo once placed in the tube, with the gyroscope set in a certain way, it is difficult to change the setting of the gyroscope without withdrawing the torpedo.

For this reason the gyroscope can give a prepared setting (the angle of train arranged beforehand); so we would, perhaps, assume too much should we ask the gyroscope to lay the torpedo's course within one degree of the desired course, as we would have to do in order to get the proper divergence between the trajectories of the torpedoes launched in salvo. For this reason we admit that the gyroscope permits us to consider the torpedo tubes as *trainable in parallel* in relation to the angles of departure that the gyroscope gives. But if, with parallel training, we launch the torpedoes simultaneously, the zone of the enemy's course that is struck will generally be too small; without the necessity of substantiating this

argument with the formulas, it is sufficient to remember that, in the case of parallel courses, the zone struck by a salvo is hardly equal to the distance between the two end torpedo tubes. Evidently the zone struck varies according to the angle between the course of the launching ship and the course of the target, and also according to the angle that the trajectories of the torpedoes make with the course of the launching ship; taking into account that, owing to the inclination of their courses, the torpedoes will intersect the enemy's course at different moments, it is easy to see that the dispersion of a salvo may be, in certain cases, even less than the distance between the end torpedo tubes, and that, in this case, the probability of hitting will be but little greater than that of a single launch.

The problem of the multiple launch cannot therefore be solved by the salvo method; so we must look into the successive launch, assuming that, as we said above, the torpedo tubes can be trained in parallel.

* * *

We indicate as usual by α and γ the relative bearings of the two opposed ships, A (launching ship) and N (target ship), by V_A and V_N the speeds; let di be the distance between two torpedo tubes. The interval of time τ that there must be between the launches in order to have two torpedoes make an uncrossable barrier of a breadth L, is given by the formula

$$\tau = \frac{L \sin \gamma}{V_A \sin \alpha \pm V_N \sin \gamma} + \frac{di}{V_A}, \qquad \text{(a)}$$

which is easily deduced and in which the term of the denominator takes + or — according as the ships are heading in approximately the opposite or the same general direction, respectively.

For launching more torpedoes, it will therefore suffice to have a *directing station of launching,* with an instrument which will give the data for firing the first torpedo, and to launch the other $n-1$ torpedoes at equal intervals of time τ, α and γ being given what are considered the mean values for the time $n\tau$. This method is practically identical with that which we recommended for the multiple launch from torpedo-boats[2]; in fact, that method differs

[2] For this method refer to "Sul problema del lancio" in *Rivista Marittima* of December, 1912, at Office of Naval Intelligence. It consists of applying corrections to the angles of sight with all tubes laid parallel.

from this only because, on a torpedo-boat, it is not possible to take account of the interval of time between the launchings.

In order for the method to be applicable it is necessary that τ be small enough; so the method gives the best results when the adversaries are steaming in approximately opposite directions. If, on the other hand, they are steaming in approximately the same direction, the resultant of the speed of the two ships along the normal to the line joining their centers, *i. e.*,

$$V_A \sin \alpha - V_N \sin \gamma,$$

is nearly zero and so τ is very large, and is infinite if, for example, the two ships steer the same course; therefore the method is not applicable in such a case.

* * *

In view of what precedes we can state:

1st. The method to adopt for the multiple launch is the method of successive launches.

2d. That if the adversaries are steaming approximately in the same direction the successive launch is not possible and therefore the launch can be made only in salvo, taking into consideration, however, that in this case the dispersion of the different torpedoes is limited to that due to accidental errors, in other words, that the probability of hitting becomes greatly reduced because the errors of the torpedoes differ very little with respect to the center of the target; thus we may have more than one torpedo hit, but it is more probable that the whole salvo will miss the target. Small dispersion of a salvo is a highly desirable factor in gun fire, but is here a serious defect because we are under conditions similar to those of a fire that cannot be improved, owing to the impossibility of seeing the point of fall, and yet is able by a single blow to put the target out of action.

TACTICAL CONCLUSIONS

The deductions obtained furnish an answer to the question: What will be the influence of the torpedo upon tactical maneuvers?

In the use of the gun, for weapons of equal power, we are obliged to enter within the range of the enemy's guns in order to have him under the fire of our own guns; on the contrary, with the torpedo it is possible (and therefore logical) to maneuver, with

respect to the enemy, so that it will be impossible for the enemy to make a launch in conformity with Table VI.

Therefore the torpedo, at great range, would have the effect of causing the adversaries to keep each other abaft their beams; the mental vision of such a battle would for this reason become that of an indecisive action in which the adversaries would draw away from each other as soon as they came within range.

In such a case, in order to provoke a resolute battle, it would be necessary for one of the adversaries to give up the development of his maximum offensive power during the period of approach, that is, to approach in a frontal formation, taking into account that a ship head-on, or very nearly so, has the minimum probability of getting hit by the torpedo, as we see from Table VII and from all that is said about the launch against a formation. A consideration of this sort leads us to think that the importance of head-on gun fire may increase with the progress of the torpedo.

It does not, however, seem necessary that the use of the gun should be sacrificed to the great extent that the head-on approach requires. In fact, speaking of the torpedo, we naturally allude to the multiple launch with a good dispersion; but we can fight steaming in the same general direction as the enemy's course and, in this case, when the launch is not impossible, the probability of hitting is very limited; if one of the adversaries does not want the torpedo to enter into the contest, he can gain his point with great ease; all he has to do is to steam in the same general direction as the enemy, and he can fight, taking only the gun into consideration, that is without running any chances, as long as the range does not get below the limit within which even the single launch has a good probability of hitting.

DISCUSSION

Tamanend *vs.* Tecumseh

(See Page 721, Whole No. 151, May-June, 1914)

Commander W. C. Cole, U. S. Navy.—In 1893, Commodore R. G. Denig, retired, published an article in the *Cosmopolitan Magazine* for April of that year, on the subject of "Historic Figureheads."

With this article as an authority, the names "King Philip," "Tecumseh" and "Powhatan" were inscribed on the base of the pedestal placed at the lower end of the Academic walks; and upon which the restored figurehead was placed in September, 1912, while I was the officer-in-charge of buildings and grounds. This restoration was done by Mr. J. E. McCusker, the foreman joiner at the Naval Academy, and is a very creditable piece of work.

The correctness of the pedestal inscriptions, mentioned in the preceding paragraph, were challenged by Rear Admiral C. C. Todd, retired, who was kind enough to dictate his views on the question. The typewritten dictation is in the file of the subject in the custody of the Committee on Memorials and Exhibits.

A letter of inquiry to Commodore Denig caused that officer to go more deeply into the subject of the history of the figurehead, and the result was the interesting but cruelly proofed article published by him in the *Army and Navy Register* of October 4, 1913, a copy, correctly proofed, by Commodore Denig, being enclosed with reference "a." The conclusions arrived at by Commodore Denig, from the examination of the meager data obtainable by him, are confirmed by the further investigation directed by the superintendent in the early part of 1913, and finally completed by the documents found in the archives of the Bureau of Construction and Repair.

It will thus be seen that Commodore Denig began and continued this investigation into the history of the figurehead, and it was he who suggested a search in the Navy Department for the confirmation of his conclusions on the subject. It will be seen, also, that Rear Admiral Todd's dissent from the views expressed by Commodore Denig, in the 1893 article, really led to the further investigation by Commodore Denig.

It is submitted, therefore, that these officers should be given credit for the parts taken by them in the settlement of this question, so interesting to us who have been graduated from the Naval Academy.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Annual Dues

The annual dues for 1915 become payable on January 1, 1915. There is no change in dues on account of bi-monthly publication. It is suggested that dues be paid in lump sums covering a period of two to five years; this method of payment has advantages for members as well as for the Institute and is practiced by a number of members, both regular and associate. Response to this notice will save the Institute a considerable sum in stationery and postage.

Special Notice

It is believed that the scope of usefulness of the PROCEEDINGS to members of the Institute can be increased and all members are invited to assist in this work. Should any topic occur to you on which you think an article could well be written, or on which you would like to read one, send such topic to the Secretary and Treasurer, together with such explanation or comment as may appear desirable in order that the intent of the suggestion may be clearly understood. The Institute is desirous of obtaining good "sea yarns" for publication. It is hoped that anyone who can spin such a yarn will submit it.

References

Attention is invited to the following articles which have appeared in the pages of the PROCEEDINGS during the past two years; they treat of subjects which closely concern Naval War College work; a perusal of them should prove profitable:

1912

Co-ordination Before and During War. By Captain F. K. Hill, U. S. N.; page 563, Whole No. 142, June, 1912.

Relations of the War College to the Navy Department. By Captain W. L. Rodgers, U. S. N.; page 835, Whole No. 143, September, 1912.

Notes on the Applicatory System of Solving War Problems, with Examples Showing the Adaptation of the System to Naval Problems. By Members of the Staff, U. S. Naval War College; page 1011, Whole No. 143, September, 1912.

The Strategic Naval War Game or Chart Maneuver. By Captain W. McCarty Little, U. S. N.; page 1213, Whole No. 144, December, 1912.

The Naval War College Course. By Captain W. L. Rodgers, U. S. N.; page 1235, Whole No. 144, December, 1912.

Mental and Moral Training for War. By Surgeon J. F. Leys, U. S. N.; page 1241, Whole No. 144, December, 1912.

1913

Trained Initiative and Unity of Action: The True Bases of Military Efficiency. By Lieutenant Commander D. W. Knox, U. S. N.; page 41, Whole No. 145, March, 1913.

Logistics: Its Bearing on the Art of War. By Commander C. T. Vogelgesang, U. S. N.; page 63, Whole No. 145, March, 1913.

Column as a Battle Formation. By Lieut. Commander D. W. Knox, U. S. N.; page 949, Whole No. 147, September, 1913.

The Naval War College, the General Board and the Office of Naval Intelligence. By Commander W. S. Crosley, U. S. N.; page 965, Whole No. 147, September, 1913.

Scouting and Screening Operations. By Lieut. Commander W. S. Pye, U. S. N.; page 1139, Whole No. 147, September, 1913.

Organization of the Fleet for War. By Lieutenant R. E. Ingersoll, U. S. N.; page 1739, Whole No. 148, December, 1913.

Bureau of Information

The Institute offers its services as a "Bureau of Information" on professional questions and will endeavor to obtain replies from the best qualified sources. Those "Questions and Answers" which are suitable for purposes of general information, will appear in the PROCEEDINGS. It is suggested that knotty questions which come up in professional examinations for promotion may well be submitted to this department.

Membership

Since September 11, 1914, thirty-three regular and eighteen associate members have joined the Institute. The following members have died:

Rear Admiral Herbert Winslow, U. S. Navy, Retired.

Rear Admiral T. H. Stevens, U. S. Navy, Retired.

The need for more members continues; bi-monthly publication should make the PROCEEDINGS more than ever valuable and necessary in keeping up with the naval profession; all members are asked to help in increasing the membership.

Notice

Whole Nos. 145 and 149 of the PROCEEDINGS (March, 1913, and Jan.-Feb., 1914) are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 25 cents per copy.

Address of Members

Members, especially those on the retired list, and civilians are urged to keep the Secretary and Treasurer informed of the address to which PROCEEDINGS are to be sent, and thus insure their receipt.

ANNAPOLIS, MD., NOVEMBER 16, 1914.

Naval and Military Record

SEAPLANE ON A LAUNCHING PLATFORM ERECTED FROM THE BRIDGE TO THE BOWS OF A BATTLESHIP

PROFESSIONAL NOTES

Prepared by LIEUTENANT C. C. GILL, U. S. Navy

GENERAL ARRANGEMENT

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* Order of sub-topics under the powers: vessels building, battleships, cruisers, destroyers, submarines, auxiliaries, personnel, naval policy.

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MISCELLANEOUS 1828
Naval Expenditure of the Powers 1828
CURRENT NAVAL AND PROFESSIONAL PAPERS 1836

NAVAL POWERS

ARGENTINE REPUBLIC

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Rivadavia.....	27,940	22.5	12 12-in., 12 6-in., 16 4-in.	Fore River Co.	Completed and undergoing trials
Moreno.....	27,940	22.5	same	New York Co.	

NOTE.—Argentine has four destroyers, displacement 950 tons, contracted for (two built at Nantes and two at Bordeaux), launched in 1911 but not yet turned over to the government. Also four additional destroyers of about 950 tons to replace those sold to Greece, building at Krupp's Germania Works. (It is presumed that these destroyers have been taken over by France and Germany respectively, as war measures.)

The Argentine dreadnought *Moreno* has successfully completed every required test of speed, according to a radiogram received from Captain Joseph I. Kemp, her navigator. She slightly exceeded contract stipulations during an eight hour run November 18, when she maintained an average speed of 22.525 knots, Captain Kemp reported. He added that she was never pushed to her speed limit and could accomplish 23 knots easily if necessary.

The *Moreno* is now on the way to the yards of her builders, the New York Shipbuilding Company, at Camden, N. J. Her sister ship, the *Rivadavia,* which was built by the Fore River Shipbuilding Corporation, will leave the Charleston Navy Yard Thanksgiving Day for the Brooklyn Navy Yard, where she is to be drydocked. It is intended to have the *Rivadavia* start for Buenos Ayres on December 15.—*New York Herald,* 11/2.

AUSTRIA

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Prinz Eugen..	20,010	20	12 12-in., 12 5.9-in., 18 12-pdr.	Trieste	Commissioned
Szent Istvan..	20,010	20	same	Fiume	Launched Jan. 17, 1914
Ersatz Mon'ch	24,500	22½	10 14-in.	Trieste	To be laid down, 1914
" Budapest	24,500	22½	same	"	" " " " 1914
" Wien....	24,500	22½	same	Fiume	" " " " 1914
" Hapsburg	24,500	22½	same	Trieste	" " " " 1915
Small Cruisers					
Saida.....	3,454	27	9 4.1-in.: 2 6-pdrs.	Monfalcone	Trials Apr., 1914
Helgoland	3,454	27	same	Fiume	Launched Nov. 23, 1912
Novara.....	3,454	27	same	"	" Feb. 15, 1913

NOTE.—Three destroyers launched in 1913, displacement 787 tons, nearing completion. Two submarines, displacement 550 tons, and three of 860 tons, contracted for in 1912 are to be built by Krupp Co. There are also 27 torpedo boats of 250 tons displacement in various stages of construction.

BRAZIL

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleship					
Rio de Janeiro	28,000 to 30,000	..	8 or 10 15-in.	Armstrong, Whitworth & Co.	Contracted for Feb., 1914

NOTE.—Three submarines, contracted for in 1912, to be built at Spezia, displacement 330 tons, were ready Aug. 1, 1913, and two have been turned over to the government.

U. S. NAVY OFFICERS TO TEACH IN BRAZIL'S WAR COLLEGE.—By special act of Congress the President has been authorized to grant leave of absence to two navy officers to enable them to accept appointment as instructors in naval strategy and tactics in Brazil's new naval war college.

"The Minister of Marine of Brazil," said Secretary of the Navy Daniels, "has recommended that contracts be made with two officers of the American navy to act as instructors in the Brazil naval war college. This flattering proposal meets with the approval of this department. It is believed that such a detail will tend to develop the friendly relations between the United States and Brazil, and that the experience which will be gained by the naval officers so employed will redound to the advantage of both navies."—*Christian Science Monitor*, 10/12.

CHILE

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Almirante Latorre	28,000	23	10 14-in., 16 4.7-in.	Armstrong, Whitworth & Co.	Launched Nov. 27, 1913
Almirante Cochrane	28,000	23	same	"	Laid down Jan. 22, 1913

NOTE.—Of the 6 destroyers of 1830 tons, built by J. S. White & Co., two have been completed. Two submarines of 420 tons displacement have been contracted for to be built by Elec. Boat Co., Seattle. (Vessels building in England have been taken over by that country as a war measure.)

CHINA

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Light cruisers					
Fei-Hung	2,600	22½	2 6-in., 4 4-in., 2 3-in., 6 3-pdr.	N. Y. Ship Bldg. Co.	Sold to Greece
.....	4,800	27	.....	Monfalcone	Ordered Nov., 1913
.....	1,800	24	.....	"	Contracted for Sept., 1913
.....	1,800	24	.....	"	same
.....	1,800	24	.....	"	same

NOTE.—Four destroyers, displacement 400 tons, are building, one at Trieste and three at Schichau. The three Schichau boats have been delivered.

DENMARK

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Niels Juel.....	3,675	16	2 9.4-in., 4 5.9-in.	Copenhagen	Laid down Sept., 1913

NOTE.—Three destroyers are under construction at Copenhagen and three submarines, displacement 200 tons, are being built by Whitehead Co.

FRANCE

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
France	23,092	20	12 12-in., 22 5.5-in.	St. Nazaire	Commissioned
Paris.....	23,092	20	same	La Seyne	"
Bretagne.....	23,172	20	10 13.4-in., 22 5.5-in.	Brest	Launched April 21, 1913
Provence.....	23,172	20	same	Lorient	" April 20, 1913
Lorraine	23,600	20	same	St. Nazaire	" Sept. 30, 1913
Languedoc....	24,828	21.5	12 13.4-in., 24 5.5-in.	La Seyne	Laid down April 28, 1913
Normandie....	24,828	21.5	same	St. Nazaire	" July 5, 1913
Flandres.....	24,828	21.5	same	Brest	" Oct. 10, 1913
Gascogne.....	24,828	21.5	same	Lorient	" Oct. 1, 1913
Bearn	24,828	21.5	same	La Seyne	Contract Jan. 7, 1914

NOTE.—There are approximately six destroyers and 23 submarines under construction.

NEW FRENCH BATTLESHIPS.—The French Navy has recently received the addition of three of the most powerful dreadnoughts in the world, viz., the *Normandie, Gascogne* and *Flandres,* which were laid down in May, 1913, and launched during October. It is certain, however, that these mammoth 25,387-ton warships cannot be ready for service for some months to come, although their completion is being rushed as fast as possible. The original official program calls for the completion of the *Normandie* and *Gascogne* in 1916 and the *Flandres* in 1917. Each of the vessels has three turrets on a center line, and each turret is equipped with four 13.4-inch guns. They are the first quadruple gun turret ships to be launched, and can fire four of the heavy guns ahead and astern, and can deliver a fire from each broadside of twelve big guns. The vessels have in addition twenty-four 5.5-inch guns and four 3-pounders. Six of the 5.5-inch guns can be fired ahead, six astern and six on each broadside. The forward turret guns are 36 feet above the load water-line; amidship guns, 32¾ feet, and the after guns 26¼ feet. The arc of fire of the center turret is 120 degrees on either beam, and of the other turrets 280. The turrets are 32 feet wide and weigh 1500 tons. Of ammunition, 1200 rounds are carried for the big guns and 6600 for the 5.5-inch guns. The main belt of armor amidship is 12¾ inches thick, seven inches at the bow and seven inches at the stern. The big gun turrets have 17½ inches of armor and the conning-tower has 13 inches. The main armor belt is 13 feet deep, eight feet of it being above and five feet below the load water-line.

An upper belt of armor 361 feet long and seven feet deep is 10 inches in thickness. There are three protective armor decks. Each vessel has six submerged 18-inch torpedo-tubes. There is special cooling to the magazines, and each ship is fitted with anti-rolling tanks and very wide bilge keels. There is a special coaling gear fitted to take on from 300 to 450 tons an hour. Each vessel is equipped with turbine and reciprocating engines combined, and has a designed horse-power of 32,000, which will give a speed of 21 knots. The normal coal supply of each vessel is 900 tons, and maximum 2700 tons. Arrangements are also made for the use of fuel oil. Each vessel carries 30 mines and has the Bullivant net defence against torpedoes.

The water-line length of the dreadnoughts is 574 feet, the beam is 92 feet and the maximum draft 28¼ feet. There are two more dreadnoughts of the same class under construction, the *Languedoc*, which was laid down in April, 1913, and the *Bearn*, which was laid down in May, 1914. Each ship has a complement of 1200 officers and men.—*Army and Navy Journal*, 10/17.

GERMANY

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Grosser Kurfürst	26,575	23	10 12-in., 14 5.9-in., 12 3.4-in.	Hamburg	Commissioned
Markgraf	26,575	23	same	Bremen	"
König	26,575	23	same	Wilhelmshaven	"
Kronprinz	26,575	23	same	Germania	Launched Feb. 21, 1914
Ersatz Worth	29,000	....	8 15-in., 16 5.9-in.	Kiel	Laid down Sept., 1913
"T" 1913	29,000	....	same	"	" May, 1913
Ersatz Friedrich III	30,000	....	8 15-in., 18 5.9-in.	....	" summer 1914
Cruisers of the Line					
Lützow	28,000	28.5	8 12-in., 14 6-in.	Dantzig	Launched Nov. 29, 1913
Derfflinger	26,500	28.5	same	Hamburg (Blohm & Voss)	Commissioned
Ersatz Hertha	28,000	28.5	8 12-in.	Wilhelmshaven	Laid down July, 1913
Ersatz Victoria Louise	.....	....	....	....	" summer 1914
Protected Cruisers					
Karlsruhe	4,900	28	12 4.1-in., 2 t. t.	Germania	Commissioned
Rostock	4,900	28	same	Howaldt	"
Regensburg	4,900	27.5	12 4.1-in.	Bremen	"
Graudenz	4,900	27.5	12 14.1-in.	Kiel	"
Ersatz Hela	5,500	27.5	10 6-in.	"	Laid down fall 1913
Ersatz Gefion	5,500	27.5	same	Stettin	" "
Ersatz Niobe	.....	....	....	....	" summer 1914
Ersatz Gazelle	.....	....	....	....	same

NOTE.—Germany has twelve destroyers and twelve or more submarines under construction. Tonnage of ships building uncertain. Changes in construction program because of war are also problematical.

According to a Berlin message received in Amsterdam, statements made by members of the Reichstag on naval expansion apparently point to the building of 12 torpedo-boat divisions, six airship divisions and a number of mine-layers and other craft. The rapid construction of three large warships and two smaller cruisers is also desired.—*Shipping Illustrated*, 9/26.

TORPEDO ARMAMENT IN CAPITAL SHIPS.—German battleships are inferior to the British in weight of gunfire, but they are fitted with more torpedo-tubes. British battleships dating prior to the *Iron Duke* class have three torpedo-tubes. The German *Nassau* and *Ostfriesland* types have six. The only advantage of the increased number is that it gives a ship the opportunity to launch a torpedo at varying angles without appreciably changing her course. In the British Navy the view is held that the high speed and long range at which battleship actions are likely to be fought greatly minimize the value of the torpedo, which is regarded as the weapon of the destroyer and the submarine. Probably this is one of many points over which the world is likely to be wiser before long.—*Shipping Illustrated*, 9/26.

SUBMARINE DEVELOPMENT.—It is only eight years since Germany launched her first submarine. She steadfastly refused to invest a pfennig in the new weapon until other Powers, notably France and England, had had the privilege of spending large sums and many valuable lives in demonstrating its limitations and its potential value. But at length, in 1906, when the French Navy already included 25 submarines and the British Navy nearly as many, a contract was placed with Krupps for the construction of an experimental boat, the *U 1*, which was launched at Kiel in August of the same year. This was a tiny craft, not much larger than the earliest British *Hollands*. Its diminutive size restricted its speed and seaworthiness, qualities said to be conspicuous in succeeding German boats.

According to the latest figures available, the German submarine flotilla on June 1 this year numbered 28 to 30 boats, ranging in displacement from 200 to 900 tons. *U 26*, representing the newest type, is credited with a speed on the surface of 17 knots. Her two Diesel engines together develop nearly 3000 b. h.-p. The armament consists of 19.6-inch tubes, number uncertain, and a couple of anti-aerial guns on collapsible mountings. No trustworthy figures in regard to the radius have been disclosed.

The training of the German underwater flotillas is known to have been most strenuous and realistic. As each group of three or four boats is handed over from the builders it is dispatched on an endurance cruise for 10 days or more, during which the weather, speed, and maneuvering capabilities of the boats are put to a thorough test. Two small cruisers, *Hamburg* and *Stettin*, and some torpedo-boats serve as seagoing escorts to the flotillas, and there is besides the special salvage ship *Vulkan*, which is really a self-propelled floating dock, in which damaged submarines can be raised high and dry and repaired even at sea. At the Germania works, Kiel, and the Danzig yard, the only two establishments which build submarines, the slips are roofed with glass and screend from view by lofty ironwork. The utmost secrecy was always maintained regarding the number of boats in hand at a given moment, and the only clue to the actual number completed was contained in official figures published at rare intervals. Hence there is always the possibility that the submarines available at a given date may be considerably more numerous than we wot of.

It is fairly certain that whatever German submarines are operating in the North Sea their base is at Helgoland, where the recently completed harbor and shops were specially designed to serve the needs of the submarine flotilla. By having this advanced base to work from the boats enjoy a wider radius than if they started from Cuxhaven or Wilhelmshaven, the saving being over 60 miles.—*Naval and Military Record*, 9/30.

GERMAN SUBMARINES BASED ON LAKE PATENTS.—It is claimed that the leading characteristics of the German submarines are based on the Lake patents. Some years ago, according to an obviously inspired article published in the *Bridgeport Telegram*, Krupp built a submarine for Russia, but

it would not function submerged properly. The Krupp firm consulted with Simon Lake, who was in Europe, to solve the troubles, which he overcame. The Krupp firm then proposed in principle to Lake to establish a shipyard in Russia and pay him 12 per cent on all submarines built in Russia and six per cent on boats built in Germany. Simon Lake agreed to act as consulting engineer. The Russian-Japanese war stopped the Krupp Russian yard project and the Krupp firm, which had the Lake plans and information, proceeded to build submarines in Germany without further consideration being given Simon Lake. German patent litigation gave Lake no practical means of relief and he dropped Germany as a field owing to the peculiar and well-known relation between the Krupp concern and the German government. The result, however, appears to be that the German submarines operate on the principles which Simon Lake originated and perfected mechanically. The German craft also have the water-tight superstructure peculiar to Lake's development in submarines. It is further claimed that the Lake craft were the first in the world to use the even keel principle of submergence and the water-tight superstructure, a combination which enables the even keel craft to run in shallow or deep water and in heavy seas. These qualities enabled the *U 9* to navigate safely on and under water the great distance necessary to make a surprise raid on the British cruisers.—*Shipping Illustrated*, 9/24.

GERMAN SUBMARINES.—So much misinformation has been given credence concerning the organization and composition of the submarine forces of the German Navy that a close study of this efficient branch of the Imperial forces will prove of interest. To begin with, the fetish of secrecy concerning structural details of German submarines should be at once swept aside. It is true that the German naval authorities made a great secret of their submarine maneuvers. On the other hand, the technical development of the submarine was accomplished wholly by engineers in civil life, and the technical world is fully aware of what has been going on in every direction as regards the design of submarine boats. The *Transactions of the German Society of Naval Architects* contain much interesting data about the submarines of the German Navy, and whatever modifications the Germans have brought into the types evolved in the United States, France, Great Britain and Germany, have been covered by patents so that it is by no means an impossible task to elucidate what German engineers have been doing in submarine work, to mention only one of the many avenues of information by which the various governments keep themselves informed as to what is going on in the naval world. Speaking generally, Germany may be regarded as a newcomer in submarine construction. In 1906 the first boat, the *U 1* made its appearance. She was built at Krupp's Germania-Werft, Kiel, and was of the submersible type, with only one torpedo-tube. The displacement submerged was 240 tons and the surface speed 11 knots, or 9 knots submerged. Her design followed the general characteristics of the d'Equevilley patents, as modified by the Germania works, to meet the views of the Torpedo Inspection Department of the German Navy. Then followed three boats, built during 1908-9 by the Schichau works, Danzing. They were of 200-255 tons displacement and 15-8½ knots, mounting two torpedo-tubes. In 1909-10 four more boats were built at the Germania-Werft, and in 1910 Schichau turned out another batch of four boats. All these boats were of the harbor defence type, but with the six boats, *U 13-18*, built during 1911-12, Germany, apparently confident of the worth of the boats which she possessed, began building submarines with a view to undertaking offensive tactics. By the spring of 1913, 18 submarines, composing two flotillas, were in active service, the latter type being of the 800-ton class and mounting two 14-pounder quick-firing disappearing guns. Another class of nine boats, *U 19-27*, was then ordered at the Germania-Werft, in which the displacement was increased to 840-890 tons, with a speed of 17-12 knots.

These boats were 213.8 feet long and 20 feet beam. The torpedo-tubes were increased to three and quick-firing guns were also mounted. These boats had armor protection over their vital parts, viz., the deck, the conning-tower, and that portion of the hull which is exposed when the vessel is awash. Coincident with the increased displacement the motor installation was made much more powerful. Each boat had two Diesel motors with a designed aggregate horse-power of 1800. The previous boats fired a 19-inch torpedo, but this was replaced by a 21-inch automobile torpedo having a maximum range of 7000 yards at a speed of 29 knots. After the satisfactory maneuvers performed by the *U 19-27* class, another batch of nine boats, *U 28-36*, was placed with Krupp and Schichau. which are still in process of completion. They are said to have a surface displacement of 900 tons and a speed of 20 knots, mounting two guns, a disappearing 14-pounder and a fixed 1-pounder. The radius of action was given as 2000 miles. At the same time an order was placed with the Fiat-San Giorgio Co., of Spezia, for a boat of the *Laurenti* type. During the autumn maneuvers of 1912 the work of the two German submarine flotillas was particularly brilliant. Their fine sea-keeping qualities and the ease with which they were able on several occasions to surprise and "torpedo" capital ships deeply impressed the Admiralty officials who witnessed the maneuvers. A noteworthy feature was the comparative immunity enjoyed by the submarines even when delivering attacks in broad daylight, for from beginning to end only two boats were ruled out of action. Whether the periscopes fitted to German boats are more efficient than those in use in other countries is doubtful. At all events, the German boats seem able to maneuver with great precision when submerged, and to come to the surface at exactly the right distance from the ship to be attacked. During these maneuvers the submarines rarely discharged their torpedoes at a range exceeding 400 yards, while more than once the distance was considerably less. Yet in hardly a single instance was their presence remarked by the object-ships in time to direct fire at them. In view of the work accomplished during the present war by the German submarine flotilla, the foregoing is of especial interest. According to an English account of the 1912 maneuvers of the German fleet, the submarines were found to be less dependent than the surface torpedo craft on mother ships and shore bases for fuel and light repairs. It was stated on good authority that the 12 submarines which took part in the maneuvers "bagged" more big ships between them than fell to the 80 or 90 destroyers and torpedo-boats divided between the two fleets. In view of such results the decision of the German authorities to develop the submarine branch with all possible celerity, both in regard to numbers and to the size and power of the units, seems natural enough. Beginning with this year, radical improvements were introduced in the organization of the submarine branch of the German Navy. The submarine service was put under separate control from that of the torpedo service. An "Inspection of Submarines" was created March 15, 1914, and placed in charge of a flag officer to supervise and control the exercises of the boats in commission and the submarine training establishment, and also to carry out all technical experiments and trials. It comprises three staff officers, 61 lieutenants, 11 subs., 37 engineers, five surgeons and six paymasters, or 123 officers in all. On July 1, 1914, two full flotillas of German submarines were in commission, each consisting of 11 boats, under the orders of a commander, and each half flotilla under a lieutenant commander. Attached to the first flotilla as depot ship is the light cruiser *Hamburg*, the *Stettin* acting in a similar capacity to the second flotilla. The first flotilla has been in existence since January 7, 1913. The larger number of boats completed since that date have enabled a second flotilla to be formed, while a third will probably be constituted when the boats now building are delivered. This section includes, besides the above-mentioned two light cruisers, three destroyers (*D 5, S 99, S 101*), three old vessels as depot and living ships, and the salvage vessel *Vulcan*. A

second *Vulcan,* now building at Danzig, will be attached on completion to the North Sea station. Upon the outbreak of war, 27 German submarines were in commission, while the *Laurenti* boat was due for delivery. She has, however, by this time been taken over by the Italian Government. So far it does not appear that the submarine branch of the German Navy has suffered losses comparable with those she has inflicted. As against the torpedoing of the British cruisers *Cressy, Aboukir, Hogue, Hawke,* and perhaps, the *Pathfinder,* besides the Russian *Pallada,* only one German submarine, the *U 15,* is positively known to have been destroyed. It is also reported that the submarine which destroyed the *Pathfinder* was sunk by gun fire from that ship, but this information is not positive. It remains to be said that the training undergone by the crews of German submarines is particularly careful and practical. At the submarine school through which each man passes before he is allowed to serve in the flotillas there is a full-size model of the interior of a submarine, with every engine and appliance in place just as in the boat itself. By this means the men become perfectly familiar with their duties, and may be said to have a good working knowledge of a modern submarine before ever they step on board. Special attention is given to the use of rescue appliances, the men being instructed as to their duty in every possible contingency. In the flotilla itself realistic experiments in the locating and raising of a sunken submarine are frequently carried out. In conclusion it can be said that the fine *esprit de corps* and discipline existing in the German Navy are nowhere more in evidence than among the men composing the crews of the submarine flotillas.—*Shipping Illustrated,* 10/31.

ADMIRAL VON TIRPITZ.—Whatever may be thought of the German Navy as a whole, it must be admitted that the head of the German Naval Department, Admiral von Tirpitz is a man of singular ability. To him befell for many years the arduous task of obtaining from a reluctant Reichstag the necessary credits for the upbuilding of the German fleet. For this task he was specially well fitted. It speaks volumes for his genius that he was able to persuade 90 per cent of the Reichstag delegates that improvement in Anglo-German relations was consequent on the growth of the Imperial Navy. His speeches on naval expansion were practically a repetition of all the arguments employed by the Flottenverein in its agitation for more and more ships, yet, thanks to his unfailing courtesy and good humor, Admiral von Tirpitz knew how to disarm criticism with an engaging smile and deprecatory wave of the hand, and lead the spokesmen of the various parties in the Reichstag to vie with one another in offering tributes to the Imperial Marine as a pillar of peace and a symbol of Germany's "Weltmachtstellung." The career of this statesman-naval strategist has been so remarkable that a few particulars may be of interest. Born plain Tirpitz on March 19, 1849 (the "von" came later), he received the Christian name of Alfred, entered the German Navy, such as it was then, at the age of 16. From an early period of his career he made torpedoes his special study, and became inspector, and later chief, of the torpedo flotillas. Attaining flag rank in 1895, he was responsible for the Navy Laws of 1898 and 1900, with the Supplementary Acts of 1906 and 1912, on which is based the German Navy as it exists to-day. Not only did he originate these acts but it fell to him likewise to see them safely through the Reichstag. In the year 1898 he became head of the Naval Cabinet, and in 1901 received an additional mark of the Kaiser's regard in the grant of the hereditary title which enabled him to make use of the coveted prefix "von." In 1896-97 he flew his flag in China, and before Germany boasted of naval attaches abroad he acted as special missioner in London from time to time. At present he is directing the German naval operations from Berlin. Without von Tirpitz it is probable there would be no German Navy of any consequence, and his name will live in history accordingly.—*Shipping Illustrated,* 10/31.

PERSONNEL BUDGET FOR 1914.—According to the Navy Budget for 1914, the active personnel this year stands at 79,080 officers and men. The strength of the naval reserve is never made public, but on mobilization there will be more than sufficient personnel available to man every vessel that is likely to be sent to sea, and to bring the staffs of the dockyards and administrative departments up to full war strength. The most careful attention has been bestowed on mobilization arrangements, and there is every reason to believe that in this important respect the German system is second to none in point of speed and smoothness in operation.—*Naval and Military Record*, 8/15.

GERMANY'S NAVAL SHIPBUILDING CAPACITY.—*The Reichstag's Ambitious Programme.*—September 11, a body of German politicians, who represent a majority in the Reichstag, offered what is tantamount to a blank check to the Imperial Navy Department.

We are told that a large number of super-dreadnoughts are to be put in hand "at once," together with a host of small cruisers, six "divisions" of destroyers, and submarines and aircraft ad lib. At one stroke "the fighting efficiency of the Imperial fleet is to be increased by 100 per cent." By "divisions" it is probable that flotillas are meant, six of which would total 72 destroyers.

As regards the construction of this emergency fleet, there is no reason to suppose German shipbuilding resources unequal to such a demand, large as it is. The yards have never been worked to their full capacity as yet, and most of them have devoted their main energies to the construction of merchant vessels, though nearly every one of the big German yards is capable of and has actually undertaken naval shipbuilding.

In this connection it is useful to recall some figures bearing on this very subject which were collected and published by Count Ernst Reventlow seven years ago. At that date a controversy was in progress with regard to the rapidity with which warships could be built in this country and Germany respectively. The German builders claimed that they were quite able to equal the best British time performance, but pointed out that the Imperial Navy Department had fixed 36 months as the normal period of construction for first-class armored ships, and refused to pay any bounty for quicker production. Owing to this rule German builders had no incentive to speed up the building rate; but all maintained that if the need arose they could easily rival the best British time record. Having circularized the leading yards on the point, Count Reventlow subsequently published the replies he had received, which were to the following effect:

Vulkan Company (Stettin): Could build and complete two battleships (18,000 tons) and two armored cruisers (15,000) within 24 to 30 months.

Weser Company (Bremen): Substantially the same claim as the Vulkan.

Krupp Germania (Kiel): Two armored ships of the largest size could be built and completed within 24 to 30 months.

Blohm and Voss (Hamburg): Precisely the same claim as the Germania.

Schichau (Danzig): Two warships of the largest size could be completed within 36 months.

Howaldt (Kiel): Practically the same claim as Schichau.

Thus the six leading yards declared their ability to produce between them 16 large armored ships, the last of which would be delivered within 36 months from the laying-down date. All of the firms, however, emphasized the fact that the date of delivery would depend in the first place on the prompt arrival of ordnance and armor from the Krupp shops at Essen. Any delay in the delivery of this equipment would, of course, retard the completion of the vessels.

Dealing with this subject in *The Navy League Annual* for 1908, I made the following comments, which it may not be inopportune to reproduce:

"Krupp's vast works at Essen represent the unknown quantity, for upon this firm must fall the whole burden of supplying the new German leviathans with armor and artillery. Germany is unfortunate in possessing but one foundry capable of turning out guns of heavy caliber, though it must be owned that, up to the present, every weapon ordered from Essen has been delivered strictly according to contract time. Government orders so far have been executed by Krupp in conjunction with work for foreign countries. It is therefore obvious that the rejection of all save national work would enable the factory to increase its present output of offensive and defensive equipment, especially as the establishment is now being enlarged very considerably. Nevertheless . . . . it is recognized in Germany that in case of emergency the supply of guns and armor might be unequal to a severe strain."

Such an emergency now appears to have arisen, but it must be admitted that since those words were written the capacity of the Essen shops has been very largely increased, both for guns and armor plate. Yet it is still doubtful whether the firm is in a position to supply the ordnance and armor for such a fleet as is now projected within two years, or even three. One or two other German firms now manufacture naval guns up to 6-inch caliber, but the whole of the main battery weapons and every ton of armor would have to be manufactured at Essen. This is the rock on which an ambitious naval scheme, such as is now proposed, may come to grief.

Since Count Reventlow published his figures another German yard has come into full operation. This is the Vulkan branch at Hamburg, which was founded in 1906, and has two slips able to take dreadnought keels. Smaller vessels, such as light cruisers, could also be built at the Tecklenborg yard, Geestemünde, and at two or three other establishments on the Baltic and North Sea coasts. To these must, of course, be added the state yards, Kiel and Wilhelmshaven for big ships, and Danzig for light cruisers. Attention is also drawn to the extensive facilities for torpedo-craft construction. Three firms specialize in this, viz., Schichau (Elbing), Vulkan, and Krupp Germania, which between them ought to be able to turn out three or four flotillas per annum. Only the Danzig state yard and the Germania build submarines at present, though it is understood that the Vulkan Company is about to take up similar work.

On the whole, therefore, we may conclude that the new naval programme would not be too much for the national yards, always provided Messrs. Krupp came up to the scratch with guns and armor. At the narrowest estimate, however, the new fleet could not be made ready under two years, and it is not to be supposed that Great Britain would be idle in the meantime. Counting only vessels already under construction, no fewer than 11 super-dreadnoughts will have been added to the British fleet two years hence, besides a score of light cruisers and many smaller fry. Consequently there is no reason to suppose that the most strenuous efforts which Germany might make during this interval would have any serious effect on relative naval strength at the termination of the period.

As regards aircraft, the position is less clear, since there is no definite information available as to our own resources in this direction. Nor is the matter of vital importance, for even the Germans do not pretend that the mastery of the sea can be gained by airships and flying machines alone at this stage of their evolution.

Long before the war there was no secret about the preparations which the German Navy was making to perfect its mining equipment. Almost every Naval Budget revealed a heavier vote for the mine section. In 1913 nearly £100,000 was spent in this way, and the annual vote was rarely less than £50,000. Germany was the first power to read aright the lessons of the Russo-Japanese war in so far as they taught the deadly efficacy of the sea mine. Shortly after that campaign terminated she laid down two special mine-ships, and since then has converted a number of light cruisers and

torpedo-craft into mine-layers. Enormous reserves of mines and their gear must have been accumulated in the last few years, judging from the heavy annual vote for this purpose.—*H. C. B., Naval and Military Record,* 9/16.

THE STRATEGIC ISLAND OF HELGOLAND.—If the sagacious men who are directing the naval policy of Great Britain had been in control at the time when Helgoland was ceded to Germany, it is safe to say that the transfer would not have been made. In that transaction Great Britain acquired from Germany a colonial possession of doubtful value, and in exchange handed over to her a small island at the entrance to the Elbe, which to-day is, next to the Kiel Canal, the most important strategic point in the whole scheme of German naval strategy. The island is small, measuring about a third of a mile in breadth by a mile in length. It consists of the Oberland, standing some 200 feet above sea level, and generally flat on its surface, and the Unterland, a stretch of low-lying shore at its foot. At the time of its acquisition in 1890, the island was subject to heavy erosion. This has been prevented by the construction of sea walls and other protective works. The value of the island from a naval standpoint lies in the fact that it is situated about 40 miles northwest of the mouth of the Elbe, and in such a position that it commands the approaches to the Elbe, the Weser, and to the great naval base of Wilhelmshaven.

The Germans have done an enormous amount of work in developing the full naval value of Helgoland, and anyone who has not visited the island for a few years would be astonished to see what remarkable changes have been made. The fine bathing beach has been done away with, and a large area of land has been made by filling. The island forms one of the most important torpedo and submarine bases for the German Navy, and a fine harbor of refuge has been constructed, together with a large number of concrete-steel buildings, some of which are in the course of construction. These buildings include artillery depots, magazines and hangars for hydro-aeroplanes, etc., together with the houses for the officers, officials, and workmen employed on the island.

Although Helgoland is still used as a summer resort, only the lower portion of the island is open to visitors. The highland is entirely under the control of the government. It has been very heavily fortified, and the heaviest artillery, both for direct fire and for high-angle fire has been emplaced. The caliber and the number of these guns have never been made public; but the Germans have repeatedly stated unofficially that among the mortar batteries are to be found pieces of 16 inches caliber. It is also stated that 16-inch guns, probably of the mortar type, are mounted on the mainland in the great fortifications at Cuxhaven. The system of defence is stated to be similar to that employed by our own coast fortifications, the whole area of the sea between Helgoland and the mainland and all that area covered by the effective range of the mortars being mapped out in squares, the progress of the enemy's ships through the fields so covered being determined by observation, and the fire of the batteries being concentrated accordingly.

It is possible that some of the 16-inch mortars have been dismounted and transported by rail to assist in the reduction of the Belgian and French fortifications; although we are inclined to think that the 16-inch piece being used in the field by the Germans is a special type of siege gun of lighter weight, firing a high explosive shell of large capacity.—*Scientific American,* 10/24.

GREAT BRITAIN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Benbow	25,000	22	10 13.5-in., 16 6-in.	Beardmore	Launched Nov. 12, 1913
Emperor of India	25,000	22	same	Vickers	" Nov. 27, 1913
Iron Duke	28,000	22	same	Portsmouth	Commissioned Mar., 1914
Marlborough	25,000	22	same	Devonport	Trials Mar., 1914
Qu'n Eliz'b'h	27,500	25	8 15-in., 16 6-in.	Portsmouth	Launched Oct. 16, 1913
Warspite	27,500	25	same	Devonport	" Nov. 26, 1913
Valiant	27,500	25	same	Fairfield	" Dec., 1913
Malaya	27,500	25	same	Walker	Laid down Oct. 20, 1913
Barham	27,500	25	same	Brown & Co.	Launched Feb., 1914
Roy'l Sover'gn	25,500	21	same	Portsmouth	Laid down, Jan. 15, 1914
Royal Oak	25,500	21	same	Devonport	" Jan. 15, 1914
Resolution	25,500	21	same	Palmer	" Nov. 28, 1913
Ramillies	25,500	21	same	Beardmore	" Nov. 12, 1913
Revenge	25,500	21	same	Vickers	" Jan., 1914
Battle Cruisers					
Tiger	30,000	30	8 13.5-in., 12 6-in.	Brown & Co.	Launched Dec. 15, 1913
Light Cruisers					
Brisbane	5,400	25	9 6-in., 4 3-pdrs.	Sydney	Laid down Jan. 25, 1913
Birmingham	5,440	25.5	same	Elswick	Commissioned, Feb. 3, 1914
Lowestoft	5,440	25.5	same	Chatham	" Apr. 21, 1914
Nottingham	5,440	25.5	same	Pembroke	" Apr. 3, 1914
Aurora	3,600	30	2 6-in., 8 4-in.	Devonport	Launched Sept. 30, 1913
Arethusa	3,600	30	same	Chatham	" Oct. 25, 1913
Penelope	3,600	30	same	Barrow	Laid down Feb. 1, 1913
Phaeton	3,600	30	same	"	" March 12, 1913
Royalist	3,600	30	same	Dalmuir	" June 3, 1913
Galatea	3,600	30	same	"	" Jan. 9, 1913
Inconstant	3,600	30	same	"	" April 3, 1913
Undaunted	3,600	30	same	Govan	Launched April 28, 1914
Cleopatra	4,400	30	.....	Devonport	Laid down Feb. 26, 1914
Calliope	4,400	30	.....	Chatham	" Jan. 1, 1914
Conquest	4,400	30	.....	"	" Feb. 28, 1914
Cordelia	4,400	30	.....	Pembroke	Launched Feb. 23, 1914
Carysfort	4,400	30	.....	"	Laid down Feb. 25, 1914
Comus	4,400	30	.....	Wallsend	" Nov. 3, 1913
Caroline	4,400	30	.....	Birkenhead	" Jan. 28, 1914
Champion	4,400	30	.....	Hebburn	" Feb. 28, 1914

NOTE.—England has approximately 31 destroyers and 24 submarines under construction.

OLD WARSHIPS.—From the naval appointments which it will have been noticed the Admiralty have resumed publishing, it appears that a use is being found for some of the old vessels of the fleet which had been thought to be past further service when they were relegated to the subsidiary list. The *Brilliant* and the *Sirius* are examples of this kind. It can well be understood how the outbreak of war has revealed various uses for such vessels, though their fighting capacity is very small. Probably it was for some such reason as this that the Admiralty always kept a few vessels on the subsidiary and sale list in good condition, ready to be brought back into service in case of an emergency. This was a better plan than selling them off immediately. It will be remembered that when some 10 years ago the board of which Lord Fisher was First Sea Lord struck off the effective list a large number of ships of comparatively small fighting value, or only available for subsidiary purposes, there were three classes of vessels, colloquially known as sheep, goats, and llamas. The sheep were those fit to serve in the first fighting line, and the goats those which were not required any more, being obsolete. Between the two, however, came the llamas,

which it was intended to keep laid up without crews, only to be brought into use again in special circumstances. The Kyles of Bute and similar places formed a refuge for these vessels, many of which might still have been there had not a fit of economy led to their being sold for breaking up. Unfortunately, many of them might have been found useful at the present time, and officers and men now being formed into naval brigades could have formed their crews.—*Army and Navy Gazette*, 9/19.

THE AUSTRALIAN NAVY.—The Royal Australian Navy comprises the battle-cruiser *Australia* (built by John Brown & Co.), having a displacement of 19,200 tons; the second-class protected cruiser *Melbourne* (built by Cammell Laird & Co.), having a displacement of 5600 tons; the second-class protected cruiser *Sydney* (built by the London and Glasgow Engineering and Shipbuilding Co.), and a sister ship of the *Melbourne;* the second-class protected cruiser *Brisbane* (built at the Commonwealth Dockyard, Cockatoo Island, Sydney), a sister ship to the *Melbourne;* the second-class protected cruiser *Encounter,* lent by the British Admiralty for training purposes, and having a displacement of 5880 tons; the ocean-going torpedo-destroyer *Parramatta,* having a displacement of 700 tons; the *Yarra* and the *Warrego,* sister ships to the *Parramatta;* and the *Derwent,* the *Swan* and the *Torrens,* three further sister ships to the *Parramatta* (built at the Commonwealth Dockyard, Cockatoo Island, Sydney); the submarine *A E 1* (built by Vickers, Ltd.), having a displacement of 800 tons; and the *A E 2* (built by Vickers, Ltd.), a sister ship to the *A E 1.* The battle-cruiser *Australia* is fitted with turbine engines giving her a speed of 26 knots; she is 578 feet long by 79 feet 6 inches beam, and she carries 24 guns and two 21-inch submarine lance torpedo-tubes. The *Melbourne* is fitted with turbine engines giving her a speed of 26 knots; she is 430 feet long by 48 feet 6 inches beam, and she carries 12 guns and two 21-inch lance torpedo-tubes. The second-class protected cruiser *Brisbane* is expected to be delivered in February, 1915. The torpedo-boat destroyers *Parramatta, Yarra* and *Warrego* are each 245 feet long by 24 feet 3 inches beam; they each carry four guns and three 8-inch lance torpedo-tubes.—*Shipping Illustrated*, 9/19.

NEED FOR CRUISERS.—The duties of cruisers are so well put by a recent correspondent of the *Morning Post* that I quote it in conclusion. He says:

"Naval officers and students of war have perpetually urged the necessity for building cruisers and yet more cruisers. They are needed to serve as a screen for the battle fleets, as scouts for the battle squadrons, as parent ships to the destroyer and submarine flotillas, but apart from those uses they are needed upon the trade routes for the double purpose of protecting British trade and capturing enemy and commerce."

And all this, true as it is, does not exhaust the cruiser duties, as for instance, convoy work, securing a base, reassuring and supporting a friend, and odd jobs which are constantly required.

If I have dwelt rather more fully on the question of cruisers and trade protection than I had intended, it is because it is the only point to which it seems doubtful if the Admiralty has given the necessary attention.—Excerpt from an article in the October *United Service Magazine.*

"OILERS" FOR THE NAVY.—With only a suggestion of ceremony the new oil-fuel carrying vessel *Ferol,* now officially described as an "oiler," was privately launched at Devonport South Dockyard. By the 1912-13 Navy Estimates two of the seven of these craft ordered were allocated to the Western Yard, and the first (the *Carol*) was launched over a year ago, and has for some time been in service. The *Ferol* differs from her predecessor, built on the same slip, in that she is provided with internal combustion engines, whereas the *Carol* is installed with those of the reciprocating type; and the *Ferol* is also the first vessel with motor engines to be built at Devonport.—*Naval and Military Record*, 9/7.

MOTOR BOAT NAVAL RESERVE.—The utility of the British Royal Naval Volunteer Reserve has been further increased by the formation of a Motor Boat Reserve, which is to be a distinct wing of it. The idea is the outcome of the patriotic liberality of private owners of motor boats in offering their craft to the Admiralty. A selection of the most suitable has been made, and many of their owners will take service in the new arm. For reconnaissance work and maintaining communication between the fleet and the shore the motor flotillas are likely to prove very valuable. The two ratings are chief motor boatman, with pay at 5s. 6d. a day, and motor boatman, at 2s. 6d. a day; in addition, 3s. a day is allowed for messing and hard-laying money.—*Shipping Illustrated*, 10/31.

GREECE

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battle Cruisers					
Salamis	19,500	23	8 14-in., 12 6-in., 12 3-in.	Vulkan Works, Stettin	Laid down July, 1912
.....	24,000	21.5	10 14-in.	Saint Nazaire	Reported that negotiations have been completed for this ship.

ITALY

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Giulio Cesare ...	22,022	22	13 12-in., 18 4.7-in.	Genoa	Completed
Conte-di-Cavour	22,022	22	13 12-in., 18 4.7-in. 14 14-pdr.	Spezia	"
Leonardo da Vinci	22,022	22	same	Genoa (Odero)	"
Andrea Doria...	22,564	23	13 12-in., 16 6-in.	Spezia	Launched March 30, 1913
Duilio.....	22,564	23	same	Castellamare	" April 24, 1913
4 ships	28,000	24	8 15-in., 16 6-in.	....	Will probably be laid down during spring and summer, 1915
Small Cruisers					
Basilicata	2,500	16.5	6 6-in.	Castellamare	Laid down Aug. 9, 1913
Campania	2,500	16.5	6 6-in.	"	" Aug. 9, 1913

NOTE.—Italy has about 15 destroyers and two submarines under construction.

PUBLIC OPINION IN ITALY.—In view of the Italian Cabinet crisis, Italian public opinion becomes very interesting. As may be expected, the long-cherished hope to reclaim Italia Irredenta (unredeemed Italy, the Trentino and Trieste) is a strong factor in the present situation. It is natural that the Italians should incline to whichever side in the present conflict promises them the possession, especially, of the Trentino—the region about the City of Trent in which a great Italian population lives. If Italy had the Trentino, her northern frontier, now interrupted by this triangular piece jutting into the peninsula, would be properly rounded.

Because of this hope, and also because they believe in the cause of the Entente Powers, certain Italian political parties—the Nationalists, the Republicans, and the Reformist Socialists—would declare for the Allies.

With the Nationalists there is a touch of humor in the situation because they used to consider France as Italy's greatest prospective enemy. Perhaps they correspond to the Bernhardi school in Germany; they seem to be *Real-Politiker,* political realists—that is to say, time-servers who will take territorial gains where they can. The other two political parties, the Republican and the Reformist Socialist, seem to be chiefly inspired by hatred of Austria, inherited from their great apostle Mazzini.

The Socialists proper preach neutrality. But these Socialists themselves fall into two classes: those who believe in absolute and those who believe in conditional neutrality. Their organ, the *Avanti,* is interesting reading these days; and their leaders—Ferrari, Mussolini, Bissolati—worth hearing. Indeed, Signor Bissolati has now actually been called to Rome to help form the new Cabinet.

Opposed to the Nationalists, Republicans, and Reformist Socialists are the Conservatives and a section of the Liberals. These are the political parties who maintain that the triumph of England, France, and Russia, no matter how inspiring for popular rights, would mean the triumph of those who have been Italy's chief competitors in the Mediterranean, and who are the protectors of the Slav power which Italy dreads.

In addition, there is a feeling among them that to fight against Germany and Austria would be in some sense a betrayal. The other day the Catholics, in congress at Milan, declared that "an attitude of hostility towards the states of the Triple Alliance and in favor of those of the Triple Entente would be, unless imposed by insurmountable necessities of national defence, an attack on the rights of nations equal to that of the violation of Belgium." This is an extreme statement, but it finds recognition even among the Entente Powers by such an organ as the *Westminster Gazette,* for instance, which says:

"We, for whom the breaking of a treaty by Germany has been a factor of such supreme importance, should do well to respect the sentiment that makes a large section of Italians averse to making war against former allies. Neither by caresses nor by veiled threats should we try to lure the Italians to our side."

Whatever the position of the Italian people, the government, like our own, has maintained up to this time its position of neutrality, in the belief that, if it can keep its military and naval forces armed and intact, it can, in the final settlement, greatly strengthen its moral position as a neutral Power, and, while legitimately attending to its own interests, can more quickly assure justice and peace.—*The Outlook,* 11/11.

JAPAN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Fuso	31,300	22.5	12 14-in., 16 6-in.	Kure	Launched Mar. 28, 1914
Fuso 2d	31,300	22.5	....	Kawasaki	Date when these ships will be laid down has not yet been settled.
Fuso 3d	31,300	22.5	....	Mitsubishi	
Fuso 4th	31,300	22.5	....	Yokosuka	Laid down Nov. 20, 1913
Battle Cruisers					
Hiyei	27,500	27	8 14-in., 16 6-in., 8 t. t.	Yokosuka	Commiss'd Mar. 31, 1914
Haruna	27,500	27	same	Nagasaki	Launched Dec. 14, 1913
Kirishima	27,500	27	same	Kobe	" Nov. 30, 1913

NOTE.—Japan has two destroyers and two submarines under construction in England and France respectively.

NORWAY

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Small Cruisers					
Bjorgvin	5000	16.5	2 9.4 in., 4 6-in., 6 4-in.	Messrs. Armstrong	Laid down Jan. 8, 1913
Nidaros	5000	16.5	same	same	Launched June 9, 1914

NOTE.—Norway has four submarines under construction. (Vessels building in England have been taken over as a war measure.)

RUSSIA

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Sevastopol	23,026	23	12 12-in., 16 4.7-in.	Baltic Works	Launched June 29, 1911
Petropavlovsk.	23,026	23	same	" "	" Sept. 9, 1911
Poltava	23,026	23	same	New Admiralty	" July 10, 1911
Gangut	23,026	23	same	" "	" Oct. 7, 1911
Emperor Alexander III	22,435	21	12 12-in., 20 4.7-in.	Nikolaieff	" Apr., 1914
Empress Marie	22,435	21	same	Ivan Bunge Co.	" Nov. 3, 1913
Catherine II...	22,435	21	same	" " "	Laid down Sept. 1, 1912
Battle Cruisers					
Ismailia.....	32,200	28	12 14-in., 21 5.1-in.	Galerni	" Dec. 19, 1912
Kinburn.....	32,200	28	same	Baltic Works	same
Borodino.....	32,200	28	same	Galerni	same
Navarino.....	32,200	28	same	Baltic Works	same
Small Cruisers					
Adm. Butakow	7,500	32	15 5.1-in.	Putilow, St. Petersb.	Laid down Nov. 29, 1913
Adm. Spiridov.	7,500	32	same	" "	" Nov. 29, 1913
Svietlana.....	7,500	32	same	Neval	" Dec. 7, 1913
Adm. Grieg....	7,500	32	same	"	" Dec. 7, 1913
Muravjev Amurski	4,500	..	8 5.1-in.	Elbing	Launched Apr. 11, 1914
Adm. Nevelskoj	4,500	..	same	"	Laid down Feb. 13, 1913
" Lazarev...	7,500	32	15 5.1-in.	N. F. & W. Nikolaieff	" Oct. 19, 1913
" Nachimow	7,500	32	.....	R. S. Co. "	same

NOTE.—Russia has about 45 destroyers and 19 submarines under construction or contract.

SPAIN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Espana.....	15,450	19.5	8 12-in., 20 4-in.	Ferrol	Commiss'd Oct. 23, 1913
Alfonso XIII..	15,450	19.5	same	"	Launched May 7, 1913
Jaime I.....	15,450	19.5	same	"	Laid down Feb. 5, 1912

SWEDEN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Small Cruiser					
Sverige.....	7100	22.5	4 11-in., 8 5.4-in.	Gothenburg	Laid down Feb. 15, 1913

UNITED STATES

NEW BATTLESHIPS.—The call for bids specified battleships having a displacement of 32,000 tons, and the following dimensions: Length over all, 624 feet; length b. p., 600 feet; breadth, extreme, 97 feet 4½ inches; draught, 30 feet; speed, 21 knots. Main batteries: Twelve 14-inch guns and four submerged submarine tubes; torpedo defence battery; twenty-two 5-inch rapid fire guns; the ships to be heavily armored, propelled by turbines, and fitted with oil-burning boilers of the water-tube type.

The Newport News Shipbuilding and Dry Dock Company was the lowest bidder at $7,195,000, as per the department's specifications, for hull and machinery, with alternate bids of $7,150,000 and $7,115,000 for a vessel with modified machinery. Under the revised system for making estimates on battleship construction the New York Navy Yard underbid this lowest private bid, giving an estimate on its battleship of $7,155,300, with an alternate bid of $6,992,859 for a battleship with electric propulsive machinery. The other bids were: New York Shipbuilding Co.—one vessel for $7,250,000, according to the department's design for hull and machinery, with alternate bids of $7,175,000 and $7,350,000, for one vessel, respectively, with modified form of machinery. Fore River Shipbuilding Corporation—one vessel for $7,440,000, and a second bid for a vessel of $7,540,000, both to be of the department's design for hull, with bidder's design of machinery of the Curtis type. William Cramp & Sons' Ship and Engine Building Co.—one vessel according to the department's design for hull and machinery, for $7,625,000.—*Shipping Illustrated,* 10/10.

THE U. S. BATTLESHIPS "OKLAHOMA" AND "NEVADA."—The battleship *Oklahoma* which was launched from the New York Shipbuilding Company's yard on March 23, together with her sister the *Nevada,* which is under construction at the yard of the Fore River Company, introduces a new era into the evolution of warship design in the states, inasmuch as in them the big guns are mounted for the first time in triple turrets, following the example set by Italy in the *Dante Alighieri,* and copied by Austria in the *Viribus Unitis.*

The previous *New York* and *Texas*—which have just entered into commission—carry the same armament as the ships under notice, viz., ten 14-inch guns, but have their weapons disposed in five twin turrets along the center-line, two forward and three aft, the second and fourth being raised to obtain axial fire over the fore and aftermost turrets. In the *Oklahoma,* three guns have been placed in two turrets, and raised to fire above these are four guns in twin mountings—the fire ahead and astern being thus five instead of four guns as previously.

The 14-inch gun mounted in these latest ships is a very much more powerful weapon than the 12-inch gun which has hitherto formed the primary armament of U. S. battleships. Its muzzle energy is 66,000 foot-tons against the 49,000 foot-tons of the 12-inch, and the shell fired weighs 1400 pounds instead of only 870 pounds and carries a correspondingly higher bursting charge.

NAVY DEPARTMENT
BUREAU OF CONSTRUCTION AND REPAIR
VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY, NOVEMBER 10, 1914

Name, type and no. of vessels	Contractor	Per cent of completion Nov. 1, 1914		Oct. 1, 1914	
		Total	Per cent on ship	Total	Per cent on ship
Battleships					
36 Nevada	Fore River S. B. Co.	77.8	72.3	75.8	69.7
37 Oklahoma	New York S. B. Co.	79.3	78.3	76.3	74.0
38 Pennsylvania	Newport News S. B. Co.	58.3	47.8	51.6	42.7
39 Arizona	New York Navy Yard	36.8	31.6	33.6	27.0
40 California	New York Navy Yard	0.0	0.0	.....	.....
41 Mississippi	Newport News S. B. Co.	0.0	0.0	.....	.....
42 Idaho	New York S. B. Co.	0.0	0.0	.....	.....
Destroyers					
45 Downes	New York S. B. Co.	95.3	95.3	95.3	95.3
51 O'Brien	Wm. Cramp & Sons.	88.4	87.1	85.2	83.5
52 Nicholson	Wm. Cramp & Sons.	86.5	85.1	84.2	82.6
53 Winslow	Wm. Cramp & Sons.	82.3	79.1	79.3	75.9
55 Cushing	Fore River S. B. Co.	73.7	70.7	68.1	64.7
56 Ericsson	New York S. B. Co.	87.4	87.3	85.3	85.2
57 Tucker	Fore River S. B. Co.	18.8	11.6	16.0	9.1
58 Conyngham	Wm. Cramp & Sons.	39.5	36.3	28.7	24.6
59 Porter	Wm. Cramp & Sons.	29.5	24.9	15.0	8.0
60 Wadsworth	Bath Iron Works.	66.4	63.4	62.2	59.0
61 Jacob Jones	New York S. B. Co.	33.7	32.2	28.6	27.0
62 Wainwright	New York S. B. Co.	33.4	31.9	28.1	26.5
Destroyer Tenders					
2 Melville	New York S. B. Co.	70.2	68.4	65.5	63.8
Submarines					
26 G-4†	American Laurenti Co. (Phila.)	‡ Accepted		96.4	95.5
27 G-2*	Lake T. B. Co. (Bridgeport)	89.7	89.7	89.7	89.7
31 G-3*	Lake T. B. Co. (Bridgeport)	85.7	85.4	83.0	82.6
34 K-3	Electric Boat Co. (Seattle)	Del'd 10-29-'14		99.7	99.7
35 K-4	Electric Boat Co. (Seattle)	Del'd 10-24-'14		99.7	99.7
38 K-7	Electric Boat Co. (San Fran.)	98.1	98.1	98.1	98.1
39 K-8	Electric Boat Co. (San Fran.)	98.1	98.1	98.1	98.1
40 L-1	Electric Boat Co. (Quincy)	67.4	63.7	61.7	57.6
41 L-2	Electric Boat Co. (Quincy)	66.2	62.4	58.8	54.3
42 L-3	Electric Boat Co. (Quincy)	66.1	62.2	58.3	53.4
43 L-4	Electric Boat Co. (Quincy)	65.7	61.4	57.3	51.9
44 L-5	Lake T. B. Co. (Bridgeport)	41.2	35.3	37.5	31.4
45 L-6	Lake T. B. Co. (Long Beach, Cal.)	41.7	35.5	38.1	32.6
46 L-7	Lake T. B. Co. (Long Beach, Cal.)	39.7	33.0	36.4	30.5
47 M-1	Electric Boat Co. (Quincy)	50.6	45.4	44.8	38.9
48 L-8	Portsmouth, N. H., Navy Yard	0.0	.....	0.0	.....
49 L-9	Electric Boat Co. (Quincy)	24.9	18.0	20.0	13.6
50 L-10	Electric Boat Co. (Quincy)	23.8	16.7	19.3	12.9
51 L-11	Electric Boat Co. (Quincy)	11.2	7.3	4.1	0.0
Submarine Tenders					
1 Fulton	New London S. & E. B. Co. (Quincy)	97.8	97.8	94.0	94.0
2 Bushnell	Seattle Construction & D. D. Co.	71.9	66.6	63.0	54.7
Fuel Ships					
13 Kanawha	Mare Island Navy Yard	82.4	81.9	78.9	78.3
14 Maumee	Mare Island Navy Yard	57.2	56.5	48.8	48.1
Miscellaneous					
Supply Ship No. 1	Boston Navy Yard	0.0	.....	0.0	.....
Transport No. 1	Phila. Navy Yard	2.5	0.0	1.3	0.0
Pan. Canal Colliers					
Ulysses	Maryland Steel Co.	56.8	51.7	50.9	43.7
Achilles	Maryland Steel Co.	51.9	42.2	45.1	35.4

*Contracts forfeited, vessels being completed New York Yard.
†Conditionally delivered at Philadelphia Yard, January 22, 1914.
‡Department on October 27, 1914, conditionally accepted G-4, the acceptance to take effect as of September 21, 1914.

The dimensions of the *Nevadas* are: Length over all 583 feet, beam 95¼ feet, draught 28½ feet, giving a displacement of 27,500 tons, or 500 tons more than the *Texas* class. Both of the ships will rely upon oil fuel exclusively, the supply being 598,400 gallons (about 2000 tons); the *Nevada* will have Curtis turbines and the *Oklahoma* reciprocating engines, steam being generated in 12 Yarrow boilers in the former and 12 Babcock in the latter. In both, the designed horse-power is 24,800 and the speed 20.5 knots.

As regards protection, a new system of armor disposal has been introduced into these ships which is more or less revolutionary. Instead of the armor being distributed from 12-inch to 5-inch as has been the usual custom, a greater portion of the displacement has been allotted to defence and the armor massed along the water-line and upon the turrets only, leaving the greater part of the hull and all the secondary guns without any protection more than the ½-inch plating of the ship's side. This "All or Nothing" method of defence is based upon the surmise that it will be better to keep the largest shells out where they can do damage and let them pass through parts which are not vital. The medium armor of 6-inch to 8-inch which serves for battery protection in most armored ships is regarded as insufficient to stop big projectiles and, therefore, only so much useless and additional weight which might be expended and utilized to more advantage by increasing the armor thickness over positions which are vital, such as the water-line, turrets and conning-tower.

Reference to the plan will show the extent of the *Nevada's* protection. The main belt is 17½ feet wide and at mean draught will extend from 9 feet above to 8½ feet below the water-line. The thickness is 13½ inches from the upper edge down to within a few feet of its bottom where it reaches a minimum of 8 inches, and it covers 400 feet of the hull. Forward it reaches well forward of the first turret and is then taken right across the ship as a 13-inch bulkhead; aft it extends some 30 feet beyond the fourth turret to its full depth of 17½ feet when there is a jog down to 8½ feet, at which it continues for 60 feet, when it turns in-board as a bulkhead of 13 inches.

The method of laying on the plates is also novel, for instead of their being placed horizontally in two strakes with a continuous joint near the water-line, they are laid vertically so that there is no continuous joint—a method which we believe has also been adopted in the *Seydlitz* and later German ships.

The two protective decks are as shown in the plan; above is a 3-inch flat deck, 9 feet above the water-line and below one 1½ inches on the flat and 2 inches on the curve where it slopes to reach the lower edge of the belt 8½ feet below the water-line.

The barbette armor reaches down to lower deck, being 13½ inches where it is unprotected by the side armor and 4½ inches below this between the two armor decks. The two sorts of turrets have different thickness of armor, that on the triple ones being 18 inches on the face, 9 inches on the backs and 5 inches roof, while the twin positions have 16-inch faces. The sides of all four turrets are from 9 to 10 inches thick.

Forward there is a 16-inch conning-tower, the communication tube extending down to the protective decks and being of the same thickness. The small bridges are built around the conning-tower and on top of it will be a range-finding station; the whole structure is perhaps one of the biggest yet put into a ship of war.

A noticeable feature of the *Nevadas* is their single big funnel instead of the two or three hitherto characteristic of United States ships; this has been made possible by the concentration of all the boilers into the central part of the ship, the boiler rooms being six in number and only occupying 65 feet. The saving of space has been made possible by the adoption of oil fuel only which is mainly carried in the double bottom, thus leaving the large amount of space which would be otherwise occupied by coal bunkers

free. The funnel base is protected by 13-inch armor instead of the 2-inch to 6-inch which usually obtains in other battleships.

In addition to the main armament of ten 14-inch guns there is a secondary battery of twenty-one 5-inch guns, which are placed along the upper and main decks and on the superstructure, ten on each side and one in the stern. The forward guns are recessed back to allow for axial fire, and the rest have wide angle ports to allow for ample arcs of training. Twelve are on the upper and seven on the main decks and two on the superstructure forward.

As is usual in U. S. ships, there are a couple of basket masts with the control top and searchlight platforms, and crane masts also bearing projectors. The torpedo equipment consists of four submerged 21-inch tubes.

A table showing her details as compared with those of her contemporaries is given below, and is interesting in demonstrating the various ways of grouping big guns. Italy and Austria favor the triple turret, and still retain the 12-inch gun—although bigger pieces are designed for later ships. England alone goes in for high speed and 15-inch guns, while Chili, Japan and Greece have adopted the 14-inch gun. France introduces the quadruple turret which has yet to prove its worth, and Germany combines an armament of 12-inch guns with very thick armor and high speed.

Of them all the *Queen Elizabeth* is of course the most powerful, with the rest all on much of the same level. Where one excels in protection the other makes up for thinner armor by heavier gun-power. None have as yet followed the United States "All or Nothing" lead in protection, but it is probable that the trend of design will come round to that view. No better phrase than Mr. Churchill's "Eggshells smashing each other with hammers" could be found to describe the present *impasse* into which the increasing size of big guns has landed the naval constructor, and the whole aspect of things seems to portend some absolutely new path of development. At present it is doubtful if any ship could stand the hammering she could receive from say the *Queen Elizabeth*. Moderately thin armor may serve some purpose in keeping out small projectiles, and the results of the fire by the 6-inch gunned cruisers on the *Empress of India* showed that these secondary guns were capable of practically making a ship unworkable—but the *Nevada* system of armoring seems to offer the only solution to the difficulty at present.

In the past the same sort of development led to the *Inflexible* with her four 80-ton guns and patch of 24-inch armor amidships to protect them. To-day we are faced by the advent of the same condition of things, and unless some fresh method of preparing armor comes along which will make plates of the same relative increase of resistance over the Krupp as Harvey was over iron, then numbers will have to replace individual concentration. When the largest guns can be mounted in moderate-sized ships, and these have the power of disabling the heaviest armor-clad since the necessary concentration of armor can only be obtained by leaving the rest of the hull exposed, then it appears as if the day of the 30,000-ton ship is drawing to a close. For a time we shall continue to build mastodons. To what size these mastodons will continue to grow is a point upon which it would be nigh useless to prophesy; that a hark-back to smaller dimensions is coming about is indicated, as is also the advent of the 16-inch gun. Whether or no they will be combined in the same ship, or whether two or more classes of battleships will be utilized—one very fast and with the bigggest guns, but with a minimum of protection, and the other slow, heavily gunned and completely armored—remains for time to decide. One thing only is certain, and that is that the torpedo, submarine and big-gun will not allow of the present evolution cycle to long continue.—*The Marine Engineer and Naval Architect*, November.

COMPARATIVE TABLE

Nation	Type	No. in Class	Displacement	H. P.	Speed	Armament	T. Tubes	Armor* A	Armor* B	Armor* C	Armor* D	
						in.		in.	in.	in.	in.	
BRITAIN	Q. Elizabeth..	5	27,500	58,000	25	viii. 15 xvi. 6	5	13½	10	13	6	Twin turrets
CHILI.....	A. Cochrane..	2	28,000	37,000	22	x. 14 xvi. 6	4	9	7	10	6	Twin turrets
FRANCE.....	Normandie...	4	24,850	35,000	21	xii. 13.4 xxiv. 5.5	4	12½	8	17	—	Quadruple turrets
GERMANY...	König.....	4	25,500	34,000	21.5 23	x. 12 xi. 6	6	13	8	13	8	Twin turrets
ITALY.....	A. Doria	2	22,000	24,000	22.5	xiii. 12 xvi. 6	3	11	9	10	6	2 Twin turrets 3 Triple turrets
JAPAN.....	Fuso	1	30,000	45,000	22.5	xii. 14 xvi. 6	5	9	8	12	6	Twin turrets
RUSSIA.....	Gangut.....	4	23,000	42,000	23	xii. 12 xvi. 4.7	4	10	8	12	5	Triple turrets
U. S.....	Nevada	2	27,500	24,800	20.5	x. 14 xxi. 5	4	13½	0	18–9	0	2 Twin turrets 2 Triple turrets

*A = Belt. B = Side above Belt. C = Big Guns. D = Secondary Guns.

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Some notes regarding the propelling machinery of the United States battleship *Nevada*, which was recently launched at the Fore River shipyard, are given by *International Marine Engineering*. The main engines consist of an improved type of Curtis turbines, placed in four water-tight compartments, arranged for twin screws. These turbines are designed to develop 26,500 shaft horse-power at 222 revolutions per minute. Each line of shafting is driven by a high-pressure turbine in the forward compartment, and a low-pressure turbine in the after compartment. Each high-pressure turbine is connected to its low-pressure unit by a 28-inch diameter exhaust pipe. In the after end of each low-pressure turbine there is built in a reversing turbine which exhausts through the common exhaust pipe to the condenser. On the forward end of each high-pressure turbine shaft there is a cruising turbine fitted with reduction gear. These cruising turbines are designed to develop 2750 horse-power at 3200 revolutions per minute. The reduction gear has a ratio of 23.3 to 1, and the main propeller shaft is thus driven at 137 revolutions per minute, which corresponds to a cruising speed of 13½ knots. The reduction gear is connected to the main turbine shaft by means of a clutch, which is operated from the working platform. The main bearings and horseshoes for the thrust bearings are provided with forced lubrication and water service.—*The Engineer*, 10/2.

"K 1" AND "K 2."—The submarines *K 1* and *K 2* have been ordered back to the plant of the Electric Boat Co., at Groton, Conn., for repairs. These boats came out a year ago and it would thus seem that serious trouble has developed about their power, which consists of Nlseco Diesel engines.—*Shipping Illustrated*, 9/26.

THE FULTON COMPLETES TESTS.—The submarine tender *Fulton* completed her government tests without mishap. She averaged 12.78 knots an hour, the requirement of the contract being only 12¼.

The interest in the trial lay in the fact that she has fuel oil engines. She develops 1000 horse-power from heavy oil, somewhat like an automobile, except that no spark is needed to produce the combustion, and fuel oil, much heavier and far cheaper than gasoline, is used. She ran on five gallons of oil to the mile, which compares with an expenditure of 200 to 300 pounds of coal.—*New York Sun*, 11/2.

NEW DRY DOCK CONTRACT.—*Government Arranges for Works at San Francisco.*—A contract was signed by the Navy Department to-day with the Union Iron Works, of San Francisco, Cal., for the construction of a dry dock at that place, to be used by the United States war ships in the Pacific. The dock will be 1096 feet in length, 110 feet wide and 40 feet on the sill. With these dimensions it will accommodate any vessel which can pass through the Panama Canal.

The Navy Department guarantees the Union Iron Works enough docking business in war ships to bring it at least $50,000 a year for six years upon a prearranged scale of prices. Meanwhile the department will attempt to make the Mare Island yard available for this work in the Pacific by dredging the channel there.—*New York Herald*, 11/14.

SUBMARINE MANEUVERS.—The largest fleet of submarines ever assembled by the navy will take part in the maneuvers planned to take place off the Florida coast this winter. It is intended to assemble the entire equipment of submarines. Six new submarines are expected to be in commission by the time of the maneuvers. In all, there should be 24 boats. It is intended that maneuvers shall be worked out with actual ships and real water. Operations by the aviation corps will probably take place also. Fleet formation with the underwater fighters will be worked out before the end of the winter.—*Marine Journal*, 10/31.

NEW CONSTRUCTION.—The programme of new construction for the next year will include two battleships. The Secretary of the Navy will attach to his annual report the recommendations of the General Board for four dreadnoughts, with a declaration that it will be a wise policy to follow the recommendations of the board if the condition of the treasury admits the expenditure of sufficient money to cover such a programme. The General Board will also recommend at least a division of five scout cruisers in addition to the four dreadnoughts. The scout cruisers will be of the high-speed type. The battle-cruiser type of ship that is being built for some of the European navies has been rejected again by the General Board as not in harmony with the naval policy of the United States.—*Shipping Illustrated*, 10/10.

TRANSFORMING PHILADELPHIA NAVY YARD FOR SHIPBUILDING.—The transformation of the Philadelphia Navy Yard at League Island from a repair station into a shipbuilding yard began September 21. The Secretary of the Navy made a special trip to the city to break the ground for the new $200,000 shipways, where a transport will soon be under construction. The item authorizing the work on the shipways carries an appropriation of $200,000, and upward of 700 men will be employed on the work.—*Shipping Illustrated*, 9/26.

NEW SYSTEM OF YARD MANAGEMENT.—The Secretary of the Navy is committed to the policy of assigning constructors and engineers to the large yards as managers under the commandant. By this system of yard management the Secretary is convinced that the expenses of maintaining the yards can be materially reduced. He will continue to appoint line officers as commandants of the large yards, but will assign constructors and engineers to duty as industrial managers under them. The New Orleans Navy Yard will be reopened. In addition to keeping a force of marines at that station, the shops will be equipped to do repair work on gunboats and small ships. It is also expected to make repairs on army transports and revenue cutters in the yards. Pensacola will be maintained as an aviation station, but considerable work will be done at New Orleans on ships that will operate in Mexican waters after the battleship fleet is relieved from Vera Cruz. The Secretary of the Navy has reached the conclusion that it would be a matter of economy to send the gunboats and other ships which are kept in Mexican waters to New Orleans for repairs instead of assigning them to some of the northern yards.—*Army and Navy Journal*, 9/26.

Naval Constructor David W. Taylor, U. S. N., will succeed Chief Constructor Richard M. Watt as Chief of the Bureau of Construction and Repair December 13. The new position of industrial manager has been or will be offered to Chief Constructor Watt, as the Secretary is very anxious that he should undertake the work of inaugurating his new system of industrial managers for navy yards. The large navy yards will continue in command of line officers, who will have jurisdiction over all the military features of the stations. When a ship is sent to a yard the captain will report to the commandant and inform him of the purpose of his visit, and the industrial managers will take charge of any repairs required, he having absolute charge of the shops and all industrial work.—*Shipping Illustrated*, 10/10.

NAVAL PAY OFFICERS' SCHOOL.—Secretary of the Navy Daniels, acting upon the recommendation of Captain George R. Clark, U. S. N., Aid for Education, has just issued an order establishing the Naval Pay Officers' School, where newly appointed commissioned assistant paymasters will be given a brief but comprehensive course of technical instruction. This school is to take the place of such more or less theoretical instruction as it has been possible for some years past to give in the Navy and Treasury Departments,

as well as the preliminary practice cruise at sea, where it has been found by experience that a newly commissioned pay officer is apt to be in everybody's way, including his own. The school will be quartered with the Naval Medical School, after which it was originally modeled; and the course will be in general about the same as that pursued by the fifty-odd pay officers who graduated in 1905 and 1906, the students being carried through a complete set of accounts just as if they were making a real cruise at sea, beginning with their reporting for duty and ending with the final settlement. In addition to having all of the inside machinery explained to them in connection with these accounts, the student officers were assisted in making a systematic study of the Navy Regulations, and in general were advised as to the various official pitfalls they needed to avoid so as to keep out of trouble. The school will open as soon as the successful candidates now being examined for assistant paymaster can be assembled in Washington—probably the middle of November—and will continue for about six weeks, after which all of the graduates will be ordered to duty at sea.—*Army and Navy Journal*, 9/26.

NATIONAL NAVAL RESERVE.—The Navy Department hopes soon to be able to begin the organization of a National Naval Reserve of 50,000 men as a source to be drawn upon should an emergency occur. The principal reason for this is the fact that the navy is, at persent, short about 18,000 enlisted men, which has resulted in many vessels being undermanned. The naval reserve will not affect the personnel of the navy only in case of war when is will be an anchor to windward and a most useful one in providing the necessary auxiliaries to the fleet with crews from this national organization. There is every reason to believe that numbers of former enlisted men will join this organization while civilians at all familiar with ships and the sea will be eligible to become members. When organized as intended, the National Naval Reserve will consist of non-commissioned officers, seamen, and others capable of performing all manner of duties on board ship from cook to aviator.

A complete card index system is to be established so as to keep track of each member. The total cost of organizing and maintaining the reserve, it is estimated, will be not more than $75,000 a year. Each member will receive a nominal salary of $1 a year in peace time and an insignia in the shape of some kind of emblem will be distributed for members to wear if they so desire. The Naval Reserve will not in any way conflict with the present State Naval Militia, but will be used to augment that body.—*Marine Journal*, 11/7.

The Executive Committee of the Navy League of the United States heartily endorses the plan of the Assistant Secretary of the Navy, Franklin D. Roosevelt, to provide for a naval reserve of 50,000 men. The secretary of the committee states that "the navy returns to civil life annually from 5000 to 7000 trained, efficient seamen, who have been honorably discharged from the navy. In fact, the navy can be said to graduate as many seamen as there are students graduated annually from the five leading universities of the country. In the emergency of war the services of this body of men would be invaluable to the government. According to the Commissioner of Navigation, there were 198,024 men in the crews of vessels of the United States in the year 1913, of which number 48.4 per cent, or 95,820, were Americans. With the recent additions to our merchant marine, it is safe to say there are now fully 100,000 Americans in the crews of our merchant marine. The Assistant Secretary, therefore, in advocating a naval reserve of 50,000 men can appeal to at least 50,000 men who have served in the United States Navy, 100,000 Americans who are serving in our merchant marine and the 7500 members of the Naval Militia, who can already be regarded as a part of the naval reserve. The League believes that should the plan meet with the approval of Congress, it will be entirely successful

and that it will cost the government a comparatively small amount. The proposed fee of one dollar a year for each man who enrolls as a member of the naval reserve could not, of course, be considered payment for services rendered. The men would simply agree to keep the Navy Department accurately informed as to their addresses and movements, and pledge themselves to respond to the call of the government in case of war. An appeal to join such a naval reserve would be purely patriotic, unselfish motives. In the opinion of the League, there is no question but that there would be an enthusiastic response to such a plan on the part of the trained seamen mentioned."—*Army and Navy Journal*, 10/31.

NAVAL MILITIA EXAMINATIONS.—Under the system of examinations agreed to at the joint meeting of the board created by the Secretary of the Navy and the Naval Militia General Board, a commission in the Naval Militia will indicate that its holder is qualified to serve in the Regular Navy in the event of war. When this scheme is put into effect the Naval Militia officers will become reserve officers for the Regular Navy. Even the officers who are now in the Naval Militia must pass an examination according to Navy Regulations if they expect to hold their commissions after February 19, 1917. During the intervening period the Naval Militia officers will have an opportunity to study under the direction of officers of the navy who will be detailed to serve as inspector-instructors with the militia. A course of study for these schools is being prepared in the Division of Naval Militia Affairs and will shortly be submitted to the Secretary of the Navy for his approval. It is planned to have the course of study completed as soon as officers of the navy are assigned to the militia. Although the details of the system of examinations for promotion have not been worked out, in all probability officers must be designated by the governors of the various states for promotion and new commissions. But before the Navy Department will issue commissions to them or promote them they must pass the required examination. The Naval Militia officers who were in Washington at the recent meeting are enthusiastic over the new qualifications for officers in their service. They fully realize that it means considerable hard work and study for officers, but appreciate that it will greatly increase the efficiency of the militia and make it a dependable force in the event of war. Under the new law the Naval Militia is more completely under the control of the Navy Department than the organized militia is under that of the War Department. The law will automatically bring the Naval Militia into the navy when war is declared and give it an opportunity for real service. Later the question of examinations for warrant and petty officers will be taken up. It is also proposed to encourage enlisted men in the Naval Militia to study for commissions in their organizations.—*Army and Navy Journal*, 10/31.

A PLEA FOR A DEFINITE NAVAL POLICY.—While it is certainly most unjust to attempt minimizing the importance of the reforms which have been brought into certain non-military phases of naval administration by the present regime, the time has come for making serious inquiries as to whether these improvements have not been obtained at the cost of radical deterioration in the branches which all naval strategists agree upon considering as essential factors of the fitness to win. It has already been admitted officially that the main fleet of the U. S. Navy has been so disorganized by two years of blockade duty in Mexican waters as to be practically unfit for battle under existing conditions. It will take at least six months of arduous drill work to whip a semblance of cohesion into the scattered units which are now grouped under the name of fleet, while lacking in the most essential strategic qualities associated with the existence of a fleet. It is most unfair to blame the present administration for this radical weakness of our naval organization, for it inherited the disagreeable duties connected with the Mexican troubles, and lack of suitable vessels prevented the employment of craft better fitted for coast patrol than first-line battleships. Even had we

possessed such vessels it would have been necessary in order to keep them in commission so long, to put first-line battleships into reserve, and thus the main battle fleet would have been placed in exactly the same position as it is to-day.

According to official admissions, the U. S. Navy is so far undermanned that it is impossible to employ efficiently even the vessels which are now available. The meddlings of Congressional Committees with technical details beyond their purview have resulted in a lopsided development of the fleet, destroying its value as a fighting unit. So entirely has the navy lacked a policy of development that its personnel is provided for almost without consideration of the size of the fleet. Congress has failed to consider even the fundamental principle that the personnel of the fleet should be proportionate to its tonnage and should increase automatically with each increase in material. This lack of policy has undermined the strength of the fleet until it now ranks third or fourth, and a continuance of this yearly compromise in Congress will find the United States in a score of years without sufficient power afloat to constitute a real line of defence. The remedy lies in the adoption of a broad policy to be pursued year after year, with a prescribed number of battleships to be built as the basis of this policy, and all other increases in light cruisers, scouts, destroyers, submarines, etc., to be made in proportion. The whole scheme of naval administration under a democratic regime is now on trial. The same problems were confronted by France less than four years ago and satisfactorily solved, and it should not be such a stupendous task for this country to set its naval house in order.—*Shipping Illustrated*, 9/31.

THE EXTENT OF A COUNTRY'S MARITIME JURISDICTION FROM HER COAST.—It is probable that among other doubtful points of international law which may be cleared up as a result of the war is that very complex one of the extent of maritime jurisdiction of the nation possessing the coast. The case upon which this momentous point is resting is that of the German liner *Kronprinzessin Cecilie*, interned at Bar Harbor, Me., in the custody of the U. S. Marshal, under orders of the U. S. Court, the ship having been arrested following an action for breach of a contract of carriage entered against it upon her return to this country with a large sum of gold specie undelivered. Bar Harbor is not a safe anchorage for a ship of the size of the *Kronprinzessin Cecilie* to lie at during winter months, and it has been proposed to send the ship either to Portland, Boston or New York, but British cruisers are patrolling the coast and as a vessel of the size of the German liner must, of necessity, go beyond the three-mile limit in the course of such a voyage along the coast, it is feared that she may be captured at sea. On the other hand, should the German ship sail out of port for the purpose of shifting to a safe berth and later turn up elsewhere in the capacity of an armed cruiser, there is every possibility that our government would find itself saddled with a claim similar to that successfully advanced by the United States in the historic *Alabama* case. It has been suggested that a warship of the U. S. fleet be sent to convoy the liner when she shifts to a safe harbor, but a lot of diplomatic work will have to be undertaken before it becomes absolutely safe for the *Kronprinzessin Cecilie* to leave Bar Harbor, even under escort.

It puzzles many people to ascertain the reason why a vessel engaged in a purely coastwise voyage is liable to interference by belligerent warships within sight of land, and many of our readers have asked us for an explanation of this state of things. To decide this question one must go very far back in diplomatic history. The matter of jurisdiction over any part of the sea is intimately connected with that of sovereignty of the seas in general, over which more blood has been spilled than over any other form of tyrannical assumption among men. In general, the right to exercise jurisdiction over any part of the sea is based on the doctrine that every nation may appropriate things which, if left free and common, would be greatly

to its prejudice. This is the reason why maritime powers extend their domain as far as possible to defend their rights. It is essential to their security and the welfare of their dominions that an unlimited freedom of approach to their territories should not be allowed to every one, especially to ships of war whose presence may prevent the access of commercial nations and interrupt navigation. The right to interdict ships of strangers from entering or approaching harbors and roads within the dominions of the sovereign has been established without interruption from the remotest antiquity. The only point in dispute, therefore, affects the extent of such sovereignty over territorial seas.

When the Senate of Rome constituted Pompey general of the sea with the duty to clear the coasts of the republic of pirates, his command was defined as extending to the distance of what corresponds to 52 nautical miles. In a treaty between the King of France and the Dey of Algiers, dated September 14, 1689, it was stipulated that the Algerines should not make prizes within 30 miles of the French coast, and treaties later entered into with the Barbary pirates by Venice, Genoa, Tuscany, Russia and the United States, confirm these dispositions. Ancient writers, such as Baldus, Bodinus, Targa and Luccenius agreed upon 60 miles from shore as the extent of a territorial sea and this view was accepted by Grotius. The greatest number of writers, however, carried the extent of dominion to the distance of 100 miles, and this opinion has so far been accepted by statesmen as a fundamental rule of public law that sovereigns have without reserve disposed of the sea to that distance from the land. The jurisdiction of the District Courts of the United States was, in cases of capture, extended to a marine league from the coast, but far more extensive claims to rights of sovereignty have been made by European powers.

The arbitrary distance of three miles from the land accepted by the United States as the extent of its jurisdiction over territorial seas is derived from the old legal maxim that the best method of fixing the extent of such seas was to restrict it to the furthest space at which a ball fired from a cannon on shore is able to hit a ship at sea. This maxim was based on the recognized principle that space is considered as territory over which officers and magistrates are able to cause the orders of their governments to be executed, either by fear or by the force confided to them. In those days and down to a comparatively very recent period, no cannon or mortar existed which could stand the strain of a propellant throwing a ball more than three miles, hence this distance came to be regarded as the reasonable limit within which the sovereign was able to carry out the functions incident to police power. Reasoning from these premises, which may be accepted as embodying the most conservative principle of universal law, the conclusion is reached that in such countries as the United States where the coast borders upon an ocean thousands of miles in extent, the power of the State would be justified in claiming as within its jurisdiction the utmost effective range of its high-power guns, or well beyond 12 miles from the coast.—*Shipping Illustrated*, 10/10.

U. S. NEUTRALITY RULES.—Regulations for the guidance of American port authorities in dealing with shipping where the neutrality of the United States in the European conflict is involved have been issued by the State Department. The regulations were drafted by the Neutrality Board, recently created to safeguard American neutrality.

The regulations are somewhat unusual, in that they avoid complicated legal formulæ, placing the matter on a simple, common sense basis:

"A. A merchant vessel of belligerent nationality may carry an armament and ammunition for the sole purpose of defence without acquiring the character of a ship of war.

"B. The presence of an armament and ammunition on board a merchant vessel creates a presumption that the armament is for offensive purposes, but the owners or agents may overcome this presumption by evidence showing that the vessel carries armament solely for defence.

"C. Evidence necessary to establish the fact that the armament is solely for defence and will not be used offensively, whether the armament be mounted or stored below, must be presented in each case independently at an official investigation. The result of the investigation must show conclusively that the armament is not intended for, and will not be used in, offensive operations.

"Indications that the armament will not be used offensively are:

"1. That the caliber of the guns carried does not exceed six inches.

"2. That the guns and small arms carried are few in number.

"3. That no guns are mounted on the forward part of the vessel.

"4. That the quantity of ammunition carried is small.

"5. That the vessel is manned by its usual crew, and the officers are the same as those on board before war was declared.

"6. That the vessel intends to and actually does clear for a port lying in its usual trade route, or a port indicating its purpose to continue in the same trade in which it was engaged before the war was declared.

"7. That the vessel takes on board fuel and supplies sufficient only to carry it to its ports of destination or the same quantity substantially which it has been accustomed to take for a voyage before war was declared.

"8. That the cargo of the vessel consists of articles of commerce unsuited for the use of a ship of war in operations against an enemy.

"9. That the vessel carries passengers, who are, as a whole, unfitted to enter the military or naval service of the belligerent whose flag the vessel flies, or of any of its allies, and particularly if the passenger list includes women and children.

"10. That the speed of the ship is slow.

"D. Port authorities, on the arrival in a port of the United States of an armed vessel of belligerent nationality, claiming to be a merchant vessel, should immediately investigate and report to Washington on the foregoing indications as to the intended use of the armament, in order that it may be determined whether the evidence is sufficient to remove the presumption that the vessel is, and should be treated as, a ship of war. Clearance will not be granted until authorized from Washington, and the master will be so informed upon arrival.

"E. The conversion of a merchant vessel into a ship of war is a question of fact, which is to be established by direct or circumstantial evidence of intention to use the vessel as a ship of war.

"1. A base of operations for belligerent warships is presumed when fuel or other supplies are furnished at an American port to such warships more than once within three months since the war began or during the period of the war, either directly or by means of naval tenders of the belligerent or by means of merchant vessels of belligerent or neutral nationality acting as tenders.

"2. A common rumor or suspicion that a merchant vessel laden with fuel or other naval supplies intends to deliver its cargo to a belligerent warship on the high seas when unsupported by direct or circumstantial evidence imposes no duty on a neutral government to detain such merchant vessel even for the purpose of investigating the rumor or suspicion, unless it is known that the vessel has been previously engaged in furnishing supplies to a belligerent warship.

"3. Circumstantial evidence, supporting a rumor or suspicion that a merchant vessel intends to furnish a belligerent warship with fuel or other supplies on the high seas, is sufficient to warrant detention of the vessel until its intention can be investigated, in the following cases:

(a) When a belligerent warship is known to be off the port at which the merchant vessel is taking on cargo suited for naval supplies, or when there is a strong presumption that the warship is off the port.

(b) When the merchant vessel is of the nationality of the belligerent whose warship is known to be off the coast.

(c) When a merchant vessel which has on a previous voyage between ports of the United States and ports of other neutral states failed to have on board at the port of arrival a cargo consisting of naval supplies shipped at the port of departure seeks to take on board a similar cargo.

(d) When coal or other supplies are purchased by an agent of a belligerent government and shipped on board a merchant vessel, which does not clear for a port of the belligerent, but for a neighboring neutral port.

(e) When an agent of a belligerent is taken on board a merchant vessel having a cargo of fuel or other supplies and clearing for a neighboring neutral port.

"4. The fact that a merchant vessel, which is laden with fuel or other naval supplies, seeks clearance under strong suspicion that it is the intention to furnish such fuel or supplies to a belligerent warship is not sufficient ground to warrant its detention, if the case is isolated, and neither the vessel nor the warship for which the supplies are presumably intended has previously taken on board similar supplies since the war began or within three months during the period of the war.

"5. The essential idea of neutral territory becoming the base for naval operations by a belligerent is repeated departure from such territory by a naval tender of the belligerent or by a merchant vessel in belligerent service, which is laden with fuel or other naval supplies.

"6. A merchant vessel, laden with naval supplies, clearing from a port of the United States for the port of another neutral nation, which arrives at its destination and there discharges its cargo, should not be detained, if, on a second voyage, it takes on board another cargo of similar nature. In such a case the port of the other neutral nation may be a base for the naval operations of a belligerent. If so, and even if the fact is notorious, this government is under no obligations to prevent the shipment of naval supplies to that port. Commerce in munitions of war between neutral nations cannot as a rule be a basis for a claim of unneutral conduct, even though there is a strong presumption or actual knowledge that the neutral state in whose port the supplies are discharged, is permitting its territory to be used as a base of supply for belligerent warships. The duty of preventing an unneutral act rests entirely upon the neutral state whose territory is being used as such a base.

"In fact this principle goes further in that, if the supplies were shipped directly to an established naval base in the territory or under the control of a belligerent, this government would not be obligated by its neutral duty to limit such shipments or detain or otherwise interfere with the merchant vessels engaged in that trade. A neutral can only be charged with unneutral conduct when the supplies, furnished to a belligerent warship, are furnished directly to it in a port of the neutral or through naval tenders or merchant vessels acting as tenders departing from such port.

"7. The foregoing propositions do not apply to furnishing munitions of war included in absolute contraband, since in no event can a belligerent warship take on board such munitions in neutral waters, or should it be permitted to do so indirectly by means of naval tenders or merchant vessels acting as such tenders."—*Shipping Illustrated*, 9/26.

ORDNANCE AND GUNNERY

THREE GUN TURRETS.—The new battleship *Nevada*, which was launched during July of this year, is to be equipped with the first three gun turrets placed on an American warship.

They will be the heaviest turrets ever set up in the world, weighing about 80 tons. It should be remembered that this weight is 11 tons more than the turrets on the Argentine battleship *Rivadavia*, which at the time of her launching was heralded as the most powerful ship in the world.

The turrets will be fitted with three 14-inch guns of an average weight of about 147,500 pounds. They are 53 feet in length, 45 caliber. The ar-

rangement of the turrets is such that there will be five 14-inch guns which can be trained ahead, and a similar number, astern, while the fire of all 10 guns can be concentrated on either broadside. The *New York* and *Texas* are at present the only vessels armed with 14-inch guns, but they carry them in five 2-gun turrets.—*Navy*, November.

TEN MILE RANGE FOR CANAL GUNS.—Projectiles capable of piercing 11.2 inches of steel armor at a distance of more than ten miles can be fired from new coast defence guns to be installed by the United States army in the defences at the Panama Canal and Manila Bay, according to the annual report of Brigadier General Crozier, Chief of the Bureau of Ordnance, made public here to-day.

These are new 14-inch guns of greater caliber than those heretofore installed in American defences and of greater power. They will discharge shells weighing 1660 pounds each with a maximum effective range of 18,000 yards, or a little more than 10 miles.

The guns of this type already made have been thoroughly tested and found wholly satisfactory, General Crozier asserts. In the manufacture of these and other guns for the army the arsenal at Watervliet has been working on a day and night basis for more than a year.

Twenty-three of the latest type of 12-inch mortars were made during the last year and all were sent to the Panama Canal. These have a maximum range of about 11 miles. A new 2-inch field gun and a new type of 3.8-inch field howitzer have been developed by the ordnance bureau. Another howitzer of still larger size has been also constructed for use at the Panama fortifications. It is a wire wound gun, firing a 60-pound projectile.—*New York Sun*, 11/13.

EFFECTIVENESS OF GERMAN TORPEDOES.—There is evidence that the torpedoes employed by the Germans carried immensely destructive warheads. Shattered old hulks and wrecked caissons in Kiel Harbor a few months since bore eloquent testimony to the force with which the mines and torpedoes then under test had exploded. Rumors of mysterious new explosives of the super-dynamite variety are always noted with a good deal of reserve, but rumors of this kind were very insistent and circumstantial in Germany not long ago. The only definite information that could be obtained was to the effect that Trotyl, or T. N. T., had been adopted by the German navy as its standard explosive. With all its advantages, and they are many, the actual destructive capacity of Trotyl is believed to be slightly inferior to that of wet guncotton, so that possibly the Germans have, in fact, hit upon a new compound. Be this as it may, the shattered hulls of the Cressy, Aboukir, and Hogue, now at the bottom of the sea, offer the most convincing evidence of the power of the enemy's torpedoes, no less than the skill with which they can be used on occasion.—*Naval and Military Record*, 9/30.

TORPEDO NETS FOR U. S. SHIPS.—Torpedo defence nets of the Roebling system have been ordered by the Navy Department for the battleships *Nevada* and *Oklahoma*. They will be manufactured by the John A. Roebling's Sons Co., of Trenton, New Jersey, who constructed the torpedo nets for the Argentine battleships *Rivadavia* and *Moreno*.—*Shipping Illustrated*, 10/10.

PROTECTION AGAINST TORPEDOES.—The steel net which has been relied on in the past for protection against torpedoes has been proved useless.

A test was made under the direction of Commander John K. Robison, U. S. N., commanding the Naval Torpedo Station at Newport, R. I., on October 7.

The torpedo, with a heavy charge of gun cotton, was fired from the torpedo boat *Morris*, while running at 18 knots, at a steel net which was moored to protect the target. The torpedo went through the net, struck the target and exploded.—*The Navy*, November.

REPORT OF CHIEF OF ARMY ORDNANCE BUREAU.—General Crozier in his report calls attention once more to the shortage of ammuition in the United States army.

"The amount of ammunition on hand for field pieces," he says, "is far short of that considered advisable, although appropriations for this purpose have been materially increased."

The supply of small arms ammunition is considered fairly adequate to the first needs of the United States in case of a war. This supply could be very rapidly increased by the manufacturing facilities in this country after the outbreak of war.

General Crozier thinks the proposal that the War Department shall be prohibited from purchasing any smokeless powder from private manufacturers would be unwise.

"The wisest policy," says General Crozier, "is for Congress to fix, as it has done, what is considered a reasonable price to be paid for smokeless powder and with that restriction to authorize the department to give private manufacturers a fair share of the work of manufacture."

General Crozier defends the system of scientific shop management in operation at some of the army arsenals. He declares that much of the opposition to what has been done in the arsenals is unwise, as he contends both the employees and the government have profited by the system.

He says there is no undue crowding of the workmen or driving them to too great a speed under the system as installed in the War Department shops. General Crozier recommends that no legislation be enacted until the Commission on Industrial Relations, which is including scientific shop management system in its investigations, has made a report.—*New York Sun*, 11/13.

ENGINEERING

GYROSCOPIC COMPASSES.—A paper on "Gyroscopic Compasses, with particular reference to the 'Sea Star' type," was read by Mr. E. Kilburn Scott at a meeting of the Institute of Marine Engineers, held on October 5. In the course of his paper the author said the advent of the iron ship rendered the use of the ordinary compass unsuitable, and compensating devices had to be added to minimize the effect of outside magnetic influences. Even with the best of these devices, however, the compass has never been entirely satisfactory. On warships especially the compasses are very susceptible to variations because of the large masses of steel, such as guns and turrets, which have to be moved, and which thus alter the induced and the semi-permanent magnetism. The conditions on submarines are such as to render magnetic compasses most unreliable for these vessels.

Another type, the gyroscopic compass, has therefore been developed, which is quite independent of the earth's magnetism. The gyroscopic compass possesses a directive force in some respects analogous to the magnetic compass, and according to the direction of spin of the wheel, the ends of the gyro-wheel axis may be called the north-seeking and south-seeking. The tendency to seek the pole is, however, many times greater than is possible with the magnetic compass, and it mainly depends on the effect of the earth's rotation on a rapidly spinning wheel, the kinetic energy of which may be made as much as desired. A great advantage of the compass is that it is easy to repeat all the movements on repeater compasses, while the master compass can be placed in a position where it is absolutely safe. Any kind of metal can be used in close proximity to a gyro-compass.

Although Foucault discovered as long ago as 1852 that, when suitably constructed, the gyroscope tended to point to the true or geographical north, it is only within the last few years that practical instruments have been constructed which will work on board ship.

The Anschutz type, evolved by Dr. Anschutz in 1900, is of pendular construction and is free to swing under the influence of gravity. To counter-

act the effect of violent rolling three gyro-wheels are employed. The wheels run at about 20,000 revolutions per minute, and the periodicity is 333 per second. Spirit levels attached to the card indicate at once if the compass is pointing true north.

The Sperry compass is suspended by means of a wire and is provided with an automatic "follow-up" device to take the twist out of the suspension wire directly the gyro-wheel moves, and to relieve the gyro-wheel from the task of overcoming friction round the vertical axis. The follow-up motor is a most essential feature of the Sperry compass. It drives round the compass card, transmitting gear, etc., and leaves the gyro-wheel very little work to do. The latter can thus be made extremely sensitive to precessional action set up by the earth's rotation. The wheel revolves at 8600 revolutions per minute and the periodicity is 145 per second.

The errors peculiar to these compasses, for which allowances are to be made, are those due to latitude, change of latitude at constant speed, change of speed, rolling and pitching, slowness of gyroscope and those produced by steering. These errors, the author stated, could be traced to one feature which both the Anschutz and the Sperry compasses have in common, viz., that they are pendular, that is to say they depend upon the force of gravity to be effective.

The "Sea Star" type, designed by Capt. V. H. Rozic and the author, is so arranged that the righting momentum does not depend on gravity for its magnitude, but is always determined by the amount of deflecting momentum that has to be counteracted. The means to this end are forcible and automatic. Another feature is that the gyro-wheel is so mounted that it is non-pendular about its horizontal axis, and, therefore, is not subject to ballistic effects. One object in view is to dispense with correction tables and mechanical correctors; another, to devise an instrument that could be made small and cheaply so as to be of use on merchant vessels, aeroplanes, etc. The "Sea Star" differs from the Anschutz and Sperry types in that the direction of rotation of the gyro-wheel is clockwise when looking at the north pointing end of the gyro-wheel spindle. The other two run counter clockwise. Owing to the direction of rotation of the "Sea Star" gyro-wheel being opposite to the rotation of the earth, the gyro-wheel is in a state of permanent unstable equilibrium and, therefore, as soon as it has been deflected in the slightest degree, there is a strong tendency to increase and the motor is immediately started to correct the deviation. There is thus a very great sensitiveness when in the meridian, and this sensitiveness allows the "Sea Star" type to be built in small sizes for the kinetic energy of the wheel is of lesser importance than with other compasses.—*The Marine Engineer and Naval Architect,* November.

OILS SUITABLE FOR TURBINES.—Generally speaking, the oils most suitable for steam turbine lubrication are pure mineral oils free from acidity and soaps, and incapable of emulsifying when shaken with warm water, and even with a well-designed bearing good results can only be attained when proper mechanical provision has been made for lubricating it efficiently and with a lubricant suitable for its particular purpose. Assuming that facilities are given for the oil to spread over the whole of the bearing surfaces, the best results are obtained by the use of a lubricant that will just keep the moving surfraces apart, under the maximum pressure to be expected, even when the turbine is stationary and at the highest temperature which the bearings may be expected to reach, for if the oil has not sufficient body to resist the pressure when the machine is at rest there will be metallic contact between the shaft and the bearings and abrasion will occur on starting, and although the oil "gets round" the bearings after a few revolutions the damage will have been done. The more viscous a lubricant and the stronger the adhesion between it and the bearings, the greater the pressure it will sustain, but a too viscous oil creates unnecessary friction, and power is wasted in overcoming it.—*The Engineer,* 9/25.

PITTING AND CORROSION OF CONDENSER TUBES.—An article by Mr. E. Bate in the *General Electric Review* deals at some length with causes leading to the pitting and corrosion of condenser tubes. These causes may be briefly stated thus: Stray currents from earthed systems, galvanic currents between the dissimilar metals of which the condenser is constructed, galvanic currents due to deposits of active material inside the tubes, use of unsuitable mixture for the material of the tubes. The increasing use of negative boosters on earthed systems prevents the first-mentioned point from being of serious importance. Regarding the second point, the alloy of which the tubes are usually composed is electro-negative to the cast iron casing, so that no corrosion of the tubes could be caused by these currents. That the third cause is responsible for the greater majority of tube failures is borne out by the fact that 96 per cent of the tubes examined by the author were pitted in the lower half, where, of course, all internal deposits would collect. It is suggested that in cases where the circulating water is drawn through a long line of cast iron piping, oxide of iron and carbon may be deposited in the condenser tubes, thus giving rise to injurious electrolytic action. The author is of opinion that, once local corrosion has commenced, it cannot practically be stopped. A suggested method of preventing this deleterious deposit in the condenser tubes is to treat the interior of the cast iron piping so as to prevent corrosion, and to keep the intake pipes as short as possible.—*The Engineer*, 9/16.

DETECTION OF FLAWS IN STEEL BY PHOTOMICROGRAPHY.—Remarkable success has attended the experiments which have for a long time been in progress at the Naval Academy, the object of which was to detect concealed flaws in masses of steel and other metals used in ship construction and engines. By photomicrographic observations it is believed that it will be possible with certainty to detect any dangerous flaws and internal cracks in the great steel shafts and other parts of the engines.—*Shipping Illustrated*, 11/7.

A YEAR'S BOILER EXPLOSIONS.—The report on the working of the "Boiler Explosions Acts, 1882 and 1890," during the year ending June 30, 1913, has just been published by the Marine Department of the Board of Trade. The report covers 80 explosions altogether. Of these, 40 resulted in loss of life or personal injury, 31 persons being killed and 42 injured. The 31 deaths were caused by 20 explosions, of which 11 occurred on land and nine on ships. Of the 80 explosions, then, one-half exactly resulted neither in loss of life nor personal injury, one-quarter exactly resulted in personal injuries only, and one-quarter exactly resulted in loss of life.

During the 31 completed years since the first act came into force, the average number of explosions per year has been just over 73, the average number of lives lost something over 26, and the average number of personal injuries a trifle more than 58. The statistics for the last completed year, therefore, show that the number of explosions which occurred is seven more than the average, that the number of deaths involved is five more, and that the number of personal injuries is 16 less than the average. On the whole, then, the position is not altogether satisfactory. The fact that the number of explosions is lower than it has been for the preceding four years is scarcely consoling when we notice that the number of deaths is higher than it has been for the preceding 11 years.

Of the 80 "boilers" that failed, 38 were under the inspection of public bodies, while 27 had not been inspected by any competent person for several years before the explosion. In 14 cases the explosions of the inspected boilers were not due to defects in the materials of the boilers, and, therefore, the inspecting societies can be questioned only as regards 24 of the explosions. We have examined the particulars of these cases and find that they involved 12 deaths and 16 instances of personal injury. They include the two most disastrous explosions of the whole 80, namely, one involving

the deaths of four people and one involving the deaths of three and injuries to three. Of the defects which the inspectors presumably failed to detect, 10 were due to corrosion, three to defective brazing, and two to defective welding. In fairness to the insurance companies, it must be stated that in only one instance, namely, that involving three deaths and three cases of personal injuries, were their inspectors found to blame, and ordered to pay costs.

Looking at all the reports we find that deterioration or corrosion was responsible for 24 of the explosions, defective workmanship, material, or construction for 16, defective design or undue working pressure for 13, water hammer for 11, and ignorance or neglect of the attendants for eight. The explosions of steam pipes, stop valve chests, and suchlike items numbered 18. Of the actual boilers that exploded, the horizontal multitubular type gave rise to 13 accidents. Water-tube boilers were responsible for nine, vertical boilers for five, Lancashire and Cornish boilers for three, and locomotive boilers for three. Tubes in steam ovens are, as usual, a fruitful source of accident, nine such cases being recorded.—*The Engineer*, 9/16.

STEAM BOILER FIRING.—An ingenious German invention, of which engineers in this country may possibly take advantage, is the Brünler system of steam boiler firing. The novelty of this system is the use of a high-pressure gas or oil jet submerged in the water of the boiler. Descriptions of the invention which have appeared in the German technical papers state that hitherto, and by all present methods, the heat of the fuel is transmitted to the water through the walls of the boiler. This involves considerable losses of heat and material. According to a contemporary the Brünler method of submerged firing, which eliminates these losses, has been used with great success in a German chemical factory. The boiler plant consists of a cast steel generator in which the flame burns under the surface of the liquid, and of a cast iron collector for the liquid, the steam and the gaseous products of combustion. The fuel used is coal tar oil.—*The Engineer*, 10/23.

"SUCTION" BETWEEN PASSING SHIPS.—*Definitions and Data.*—"Suction" is a term commonly applied by pilots to at least three distinct hydraulic phenomena associated with moving vessels, between which phenomena they distinguish most vaguely, if at all. These three quite independent actions are:

1. The direct impulse embodied in the streams of water projected astern by screw or paddle, independently of any motion of the ship itself.
2. The direct effect of the mass of water which follows a ship bodily when it is moved slowly through restricted waters.
3. The indirect, or lateral pressure, effect of the fore-and-aft acceleration of the water displaced from bow to stern during normal motion through the water at full speed.

Of these, the first two are most simple and obvious, hydraulically speaking, because there the force exerted is aligned with the water's motion. In the case of the last, the force developed hydraulically acts at right angles to the line of the water's motion. The first two need no explanation, and have nothing in common (speaking scientifically) with the third. They play an insignificant part, if any at all, in the majority of "suction" collisions, and are mentioned here chiefly for the purpose of eliminating them from further discussion. They are of frequent occurrence in the daily handling of shipping about crowded wharves, and for want of other name, or in lack of official definition, they are frequently called "suction."—*Engineering*, 8/7.

KIOSK-HYDRO FOR SUBMARINE OBSERVATION.—An Italian engineer has invented what is called a kiosk-hydro, which consists of a circular steel observation chamber in the walls of which are double water-tight windows. Above these windows are electric lamps of 10,000 candle-power, fitted with reflectors, and capable, it is claimed, of projecting light a distance of 1500

feet when the water is clear. The chamber has a sloping roof which narrows into a steel tube through which two staircases, one for descent and the other for ascent, lead to the water level. The upper part of the kiosk-hydro may either take the form of a floating kiosk, rising and falling with the tide, and connected with a pier by a gangway, or it may be part of the pier itself, with the observation chamber suspended just above the bed of the sea. Glass half an inch thick is used for the windows, and the steel shell is of the same thickness.—*Marine Journal*, 8/29.

AERONAUTICS

AERONAUTICS.—It is interesting to learn that all of the English army aeroplane squadron flew under their own power from their base in England to the scene of action in France, where they have taken a prominent part in the work of reconnaissance.—*Scientific American*, 10/24.

DIRECTING GUN FIRE BY MEANS OF AEROPLANES.—An Associated Press dispatch published in most of the New York newspapers states that the German aviators have been directing the artillery fire about Mons. This is exactly what military experts expected. It will be remembered that during the Russian-Japanese war the eminence known as "203 Meter Hill" was captured and recaptured again and again by both Russians and Japanese, finally to remain in the hands of the Japanese. The hill was wanted not to plant guns on it, but simply to enable a man with a telescope to direct the fire of the Russian battleships on Port Arthur. An aeroplane would now perform the same function much more effectively and, of course, with little or no loss of life.—*Scientific American*, 10/13.

A NEW MILITARY AEROPLANE.—A new type of military aeroplane, designed by Glenn H. Curtiss, has been tried out at San Diego, Cal., and developed remarkable speed and climbing ability. The new machine has wings shaped like those used on the flying boat *America*, the under surfaces being almost flat, while the upper faces are highly arched, with a wing spread of over 40 feet. The official requirements were that a weight of 600 pounds of useful load should be carried at a speed between 45 and 70 miles an hour, and climb at least 300 feet in 10 minutes. It must also be able to rise from long grass or harrowed ground. In the trials all of these requirements were easily exceeded, although the engine was rated at only 90 horse-power, and a speed of 86 miles an hour is said to have been attained.—*Scientific American*, 9/10.

RADIO

WIRELESS TELEPHONES FOR ITALIAN WARSHIPS.—It is stated that Italian warships are shortly to be installed with the wireless telephones invented by Mr. Marconi. It is claimed that conversations can be carried on distinctly at a distance of 10 miles.—*Shipping Illustrated*, 10/7.

VIOLATION OF NEUTRALITY BY MARCONI WIRELESS.—The Navy Department on October 16 received a dispatch from Rear Admiral C. B. T. Moore, U. S. N., commandant of the naval station in Hawaii, stating that immediately after the arrival at Honolulu of the German gunboat *Geier*, and during the temporary absence of the navy censor, the Marconi Wireless Company sent a wireless message announcing the arrival of the *Geier*. Inasmuch as this action constitutes a clear violation of neutrality, because it gave positive information of the operations of a belligerent and his actual position, the Acting Secretary of the Navy has directed Admiral Moore to demand at once an explanation of this action by the Marconi Company, and that in case a satisfactory explanation is not received within 24 hours he shall close the Marconi station.—*Army and Navy Journal*, 10/17.

FOG SIGNALS BY WIRELESS.—In a recent issue of the *Wireless World* a description is given of the control of fog signals by wireless. The signals, which are placed at various points in the Firth of Clyde, consist of Stevenson-Moyes gas "guns," in which a charge of acetylene and air is fired at intervals. The gas admission and ignition is quite automatic, and once the gas is turned on the cycle of operations proceeds regularly. All that is required is to control the gas valve electrically, so that it can be turned on in time of fog. The needle valve used for the purpose is actuated by two electromagnets, one for opening and the other for closing. These are controlled by a relay working in conjunction with a special form of coherer, which receives the signals through a jigger transformer. The principal feature of the apparatus is the selective synchronizer, by which the apparatus only responds to a particular signal, different signals being employed for the turning on and turning off circuits. A 14-foot receiving aerial of the wires is used, and the transmitting apparatus is of the simplest character, embodying synchronizers of similar nature to the receiving synchronizers for giving the correct signals. One of these fog guns is at work on Roseneath Patch and is worked from Gourock. Another is at Fort Matilda, and two more are about to be installed.—*The Engineer*, 9/16.

CANALS

RIGHTS OF WARSHIPS AT PANAMA.—Terms under which warships of belligerents may find shelter in the waters of the Republic of Panama are outlined in a protocol recently signed between that country and the United States, which reads as follows:

"The undersigned, the Acting Secretary of State of the United States and the Envoy Extraordinary and Minister Plenipotentiary of the Republic of Panama, in view of the close association of the interests of their respective governments on the Isthmus of Panama, and to the end that these interests may be conserved and that when a state of war exists the neutral obligations of both governments as neutrals may be maintained, after having conferred on the subject and being duly empowered by their respective governments, have agreed:

"That hospitality extended in the waters of the Republic of Panama to a belligerent vessel of war or a vessel belligerent or neutral, whether armed or not, which is employed by a belligerent power as a transport or fleet auxiliary or in any other way for the direct purpose of prosecuting or aiding hostilities, whether by land or sea, shall serve to deprive such vessel of like hospitality in the Panama Canal Zone for a period of three months, and *vice versa*."—*Marine Journal*, 10/31.

RECONSTRUCTION OF THE KIEL CANAL.—In 1895, after eight years of hard work, the great canal running from the mouth of the Elbe, in the North Sea, to the Fjord of Kiel, in the Baltic, a distance of about 60 miles, was thrown open to commerce. It had a normal width of 72 feet at the bottom and 220 feet at the water level, with a depth of 29½ feet. Although a sea-level canal, twin locks were built at each end, those at the western entrance to take care of the large tide variations, and those at the eastern end to take care of variations of water level, in the practically tideless Baltic, due to gales. The locks were 492 feet long, 82 feet wide, and 32 feet deep. The locks at Kiel remained open most of the time, while those at the mouth of the Elbe did not need to be used at certain tides.

The canal proved wonderfully valuable to commerce, because it saved the long, hazardous trip around the stormy coasts of Denmark. But its strategic value to the German Navy was of even greater importance, as has been demonstrated in the present war.

Although the locks, when built, were large enough to take almost all vessels, they were outgrown in time, even by warships, and finally it was decided to reconstruct the canal, making it broader and providing locks

that could take the largest vessel afloat, with plenty of room to spare. This work was completed in time to be of incalculable value to Germany in the present war.

The normal width of the canal is now 335 feet at the surface and 144 feet at the bottom, with a depth of 36 feet. New twin locks have been built alongside the old ones at each end. They have an available length of 1082.6 feet and width of 147.6 feet. Intermediate gates may be used to cut off a chamber 328 feet long. The locks at Panama, it will be recalled, are only 1000 feet long by 110 feet wide.

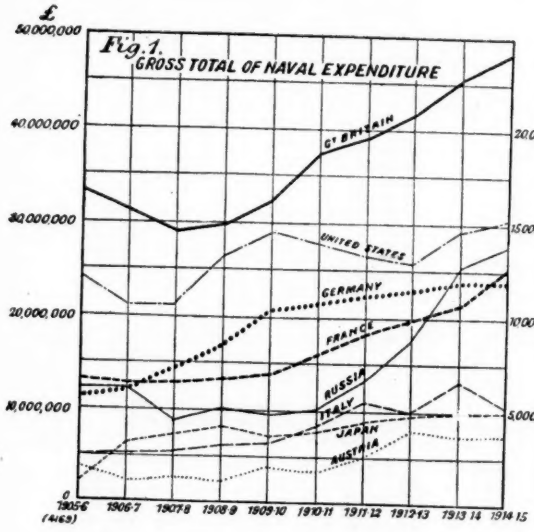
The work of reconstructing the canal cost $55,000,000.—*Scientific American*, 9/19.

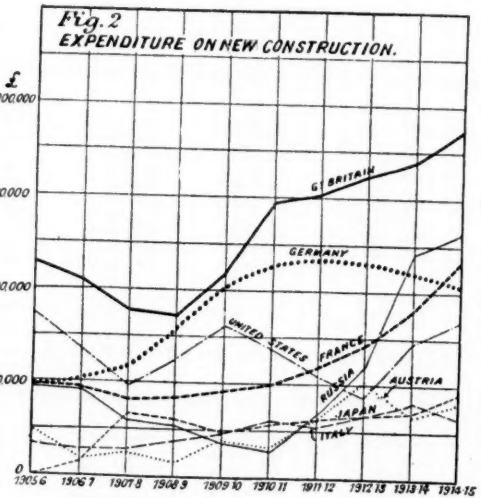
PANAMA ACCOMMODATIONS.—Coal will be delivered in the ships' bunkers on the Pacific end of the canal at not exceeding $6.40 a ton, or at a canal or Atlantic end wharf for less. Fuel oil can be had at canal ports for $1.30 a barrel. Very reasonable dry docking rates are another inducement offered to bring shipping to the Canal Zone. The Pacific end dry docks, that are to be among the largest in the world, are not yet completed, but should a vessel need a dry dock there, it could be put into one of the locks which, when freed from water, could be made to serve the same purpose. The canal equipment also includes three tourist hotels and a first-class 800-bed hospital. —*Marine Journal*, 11/7.

INLAND WATERWAYS AND THE NAVY.—In a speech at Albany during the convention of the Atlantic Deeper Waterways Convention on September 24, advocating the prompt construction of the waterway to parallel the Atlantic Coast, Secretary Daniels pointed out the value that this improvement would be to the navy by showing that, in any conflict between naval powers, the navy of the weaker power takes refuge in some deep and well-defended harbor, where it seeks to weaken its enemy by fighting it in detachments and in other ways wearing down its strength. If, after this weaker power has taken such refuge, it can maneuver its ships through inland channels to other exits, it enjoys a great advantage. So far as the work of submarines goes alone, Mr. Daniels said, such an inland waterway as the one proposed would enable them to do much more effective work, as they would be able to slip out at various exits for the purpose of doing damage to the enemy. In times of peace the canal would also be very useful to the navy in transporting the large quantities of heavy material constantly required by the government for its navy yards, and on these the transportation charges by the waterway would be more than cut in half.—*Marine Journal*, 10/11.

MISCELLANEOUS

THE NAVAL EXPENDITURE OF THE POWERS.—There was issued this week the annual Parliamentary return showing the naval expenditure of each of the eight principal naval powers—Great Britain, France, Russia, Germany, Italy, Austria-Hungary, the United States and Japan. This return gives in tabular form information regarding the navy estimates and construction of the various powers between 1905-6 and 1914-15. It is pointed out that in the case of Britain the naval expenditure includes pensions and other items which are not charged to the navy votes of other principal powers, and that for direct comparison it is necessary to deduct such figures from the British totals. In Table I is given the British expenditure less such items as pensions, etc.; in the case of other powers small items have been added when corresponding items are charged to our navy vote. The figures given in Table I are therefore directly comparable. The figures in this table are set out in curves in the diagram, Fig. 1, and this shows the position and the increasing naval expenditure at a glance.


£
50,000,000
40,000,000
30,000,000
20,000,000
10,000,000
0
Fig. 1.
GROSS TOTAL OF NAVAL EXPENDITURE
GT BRITAIN
UNITED STATES
GERMANY
FRANCE
RUSSIA
ITALY
JAPAN
AUSTRIA
1905-6
(4 1/2 m)
1906-7
1907-8
1908-9
1909-10
1910-11
1911-12
1912-13
1913-14
1914-15


£
20,000,000
15,000,000
10,000,000
5,000,000
0
Fig. 2
EXPENDITURE ON NEW CONSTRUCTION.
GT BRITAIN
GERMANY
UNITED STATES
FRANCE
RUSSIA
AUSTRIA
JAPAN
ITALY
1905-6
1906-7
1907-8
1908-9
1909-10
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1911-12
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1913-14
1914-15

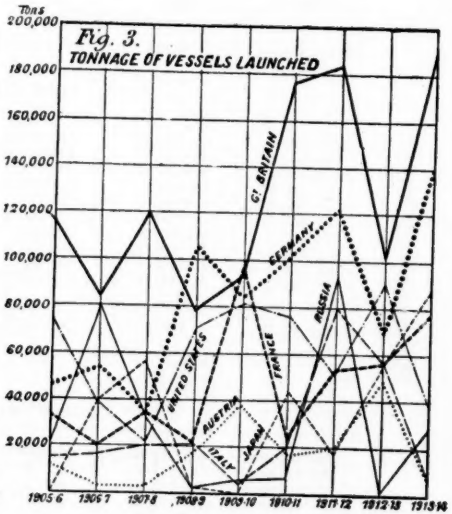

TONS
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
Fig. 3.
TONNAGE OF VESSELS LAUNCHED
GT BRITAIN
GERMANY
RUSSIA
FRANCE
UNITED STATES
AUSTRIA
JAPAN
ITALY
1905-6
1906-7
1907-8
1908-9
1909-10
1910-11
1911-12
1912-13
1913-14

TABLE I. GROSS TOTAL OF NAVAL EXPENDITURE

Year	Great Britain*	Germany	France	Russia	Japan	Austria	Italy	United States
1905–6	33,387,568	11,472,715	13,224,364	12,392,684	2,388,018	3,838,975	5,040,000	24,444,948
1906–7	31,110,688	12,223,089	12,846,771	12,490,444	6,311,420	2,398,223	5,322,154	21,358,199
1907–8	29,119,929	14,511,863	13,099,549	8,850,240	7,371,777	2,713,540	5,661,822	21,260,732
1908–9	29,847,582	16,861,803	13,440,357	10,222,733	8,258,082	2,477,671	6,266,193	26,438,434
1909–10	32,323,255	20,522,959	14,054,063	9,650,167	7,346,879	4,068,333	6,537,118	28,999,592
1910–11	37,296,340	21,388,357	15,761,511	10,227,604	7,729,968	3,545,727	8,341,766	27,848,111
1911–12	39,165,611	22,261,732	18,209,298	13,296,370	8,861,829	5,152,382	10,832,047†	26,569,606
1912–13	41,559,318	22,907,207	19,894,468	17,681,213	9,533,997	7,867,644	10,054,505	25,902,577
1913–14	45,510,836	23,742,687	21,317,634	25,392,784	9,938,433	7,332,703	13,333,762	29,482,991
1914–15	48,113,203	23,740,349	25,412,685	27,769,294	10,023,919	7,408,196	10,313,009	30,331,364

*The figures for Great Britain exclude pensions and other items not charged to the navy expenditure of other powers.
†Includes 2,320,000*l.* for war expenses.

TABLE II. EXPENDITURE ON NEW CONSTRUCTION

Year	Great Britain	Germany	France	Russia	Japan	Austria	Italy	United States
1905–6	11,368,744	4,720,206	4,705,295	4,576,370	.....	2,371,916	1,714,556	8,683,000
1906–7	10,486,397	5,167,319	4,652,010	4,576,583	767,647	1,012,409	1,362,207	6,776,086
1907–8	8,849,589	5,910,959	4,138,967	2,846,268	3,297,964	1,186,667	1,398,111	4,872,888
1908–9	8,521,930	7,795,499	4,193,544	2,703,721	3,027,276	716,662	1,866,358	6,227,874
1909–10	11,076,551	10,177,062	4,517,766	1,758,487	2,392,483	1,908,231	2,190,707	7,976,897
1910–11	14,755,289	11,392,856	4,977,682	1,424,013	2,748,349	1,583,333	2,981,200	6,880,005
1911–12	15,148,171	11,710,859	5,876,659	3,216,396	2,997,493	3,125,000	2,677,302	5,343,789
1912–13	16,132,558	11,491,187	7,114,876	6,897,580	3,289,797	5,114,206	3,227,000	4,226,728
1913–14	16,883,875	11,010,883	8,893,064	12,082,516	3,550,721	3,288,937	3,933,000	7,258,953
1914–15	18,676,080	10,316,264	11,772,862	13,098,613	4,623,919	4,051,976	3,237,000	8,443,796

TABLE III. TONNAGE, WHEN COMPLETED, OF VESSELS LAUNCHED

Year	Great Britain	Germany	France	Russia	Japan	Austria	Italy	United States
1905–6	116,570	45,729	31,381	20,416	.....	11,021	14,555	74,000
1906–7	83,260	53,180	19,338	80,860	39,870	2,233	16,016	37,283
1907–8	119,937	33,985	33,602	31,461	56,450	2,364	19,510	20,633
1908–9	77,202	104,971*	21,205	1,834	1,620	16,034	21,021	69,341
1909–10	92,957	83,184*	96,308	4,371	Nil.	37,122	2,404	80,822
1910–11	176,582	101,830*	21,860	6,130	43,900	16,384	19,642	75,935
1911–12	183,283	123,130*	53,125	93,710	10,800	20,010	80,289	51,542
1912–13	113,058	69,400*	55,776	914	55,081	49,269	57,051	91,477
1913–14	189,740	139,865*	78,313	29,899	85,600	6,543	6,937	36,472

* The tonnage of German ships since 1908 does not include submarine boats.

In Table II there is recorded the expenditure on new construction in the various years, as taken from the statistical abstracts now issued by the government. These figures are plotted in curves in Fig. 2.

The third table shows the tonnage, when completed, of the vessels launched in each of the financial years by the respective powers. This necessarily fluctuates, as is shown in the diagram, Fig. 3.—*Engineering*, 9/25.

DEBTS OF LEADING NATIONS.—The debts of the leading nations of the world are as follows, in round numbers: United States, $1,200,000,000; Great Britain, $3,900,000,000; Russia, $5,000,000,000; France, $5,200,000,000; German Empire, $1,240,000,000; Australia, $1,480,000,000; Canada, $400,000,000. The United States is not only the richest country in the world, but has greater wealth than any other two countries on earth combined.—*Marine Journal*, 10/31.

MEANS OF PROTECTING COMMERCE.—In peace discussions, three ways of protecting commerce effectively were put forward. One was the old system of convoy, which had come to be regarded with decreasing favor. Another was the searching of the seas in which the raiders were assumed to be operating by a series of prearranged sweeps, a method which depended a good deal upon the number and class of the vessels available for carrying it into effect. A third scheme was that termed the spider's web, the idea of which was that in the center of each ocean infested by commerce raiders there should be a battle-cruiser, attended by a large number of satellites in the shape of auxiliary ships fitted with wireless. It is timely, in view of the interest aroused in the subject by recent happenings, to recall that naval opinion was by no means unanimous as to the best means of clearing the seas of the enemy's commerce destroyers. The objection to the convoy system was that few shipowners could be expected to conform to it. The fast steamers would not wish to be hampered by the slow, and even the slow might not like the idea of having to wait several days for a convoying force. Many merchants would probably like to have had the alternative of sending ships under convoy, but in that case there arises the question whether enough cruisers could be spared to send off frequently, say more than once or twice a month. As to the policy of employing battle-cruisers to hunt down raiders, this may be said to have been virtually abandoned when the vessels of this class came to be regarded as ships of the line. Soon after they had been completed the *Invincibles* were generally accepted as best fitted to form the fast wing of the battle fleet. The task of keeping clear the trade routes therefore remained within the province of the other classes of cruisers, of which it has been officially stated that 70 are now employed on such work. This number includes several vessels of the French, Russian, Japanese, and Australian navies, some of which must be faster than the ships of which they are in chase.—*Army and Navy Gazette*, 9/31.

THE STRENGTH OF WIRE ROPE.—An investigation of the strength and durability of wire rope has been made by Professor G. Benoit at the technical high school at Karlsruhe, and as far as completed is substantially as follows: The experiments were made with a patented cast-steel wire, 1 mm. in diameter, which showed a strength of 247,000 to 255,000 pounds per square inch, with 227,000 pounds per square inch guaranteed. The wire was tested singly, and also twisted to a strand of seven wires, 3.1 mm. in diameter, there being six steel wires and a core of a softer wire of a strength of about 122,000 pounds per square inch. This rope withstood a pull of 1770 pounds. The soft core did not break, but stretched considerably. Three of the strands were then combined to a rope of 6.8 mm. in diameter and five to a rope of 8.5 mm. in diameter, the latter with a hemp core. The wires and ropes were bent over a pulley through an angle of about 90 degrees, at the rate of 1000 turns per hour, the turn meaning the bending of the wire from the straight and then back to the straight again. The stress to which the

wire under test was generally subjected was 11,200 pounds per square inch. The single wires stood 198,710 bends; the twisted strand had one or two wires broken after 44,800 and 47,190 bends. The first experiment was carried on with a pulley 6⅞ inches in diameter,and a larger pulley was then substituted, 7⅛ inches in diameter. On this the single wire stood 122,000 to 200,000 bends; the twisted strand showed breaks in three wires after 40,860 bends. The cable of three ropes had one wire broken after 22,860 bends, and is said to have been practically done for after 36,440 bends. The five-rope wire began to fail after 35,000 bends, and was given up after 40,000 bends. The conclusion so far seems to indicate that twisting leaves considerable strains in the wire rope, and especially in those of high-class steel.—*Shipping Illustrated*, 9/26.

COLOR-BLINDNESS.—During recent years the subject of color-blindness has received much attention, especially in relation to men working on railways and on ships. Engine-drivers and ships' officers are now subject to examinations as regards their sight, both in respect to its strength and also to the power of discriminating between different colored lights. Many tests have been devised by means of wools and colored counters by which the sight of such people can be tested. It has now been found that color-blindness is always inherited, and that a man whose ancestry is free from it never exhibits it. Curiously, as was explained by Professor William Bateson, in his presidential address, delivered before the British Association at Sydney on August 21, color-blindness is always inherited through the mother, and never through the father. There appears to be no instance in which a color-blind father has transmitted his defect to his children except in connection with a mother who was a transmitter. It does not follow, however, that the mother herself need be color-blind, but she must have inherited the power of transmitting this defect from the ancestor. Some, probably all, the daughters of a color-blind father inherit the power of transmitting the defect, although they themselves may not be color-blind, and, as a rule, they transmit it to about one-half of their offspring of both sexes. The sons who inherit color-blindness are, of course, color-blind, but they do not themselves transmit it; it is the inheriting daughters who become the transmitters to the next generation. These facts ought to be of considerable assistance in the future to those who are responsible for investigating the eyesight of engine-drivers and officers of ships, provided that they are able to carry their investigations back through at least a couple of generations in the family. If it can be shown that two generations are free from color-blindness there is at least very good reason for supposing that the third generation will also be free.—*Engineering*.

REPRESENTATIVE MANN'S SPEECH ON QUESTIONS OF THE FAR EAST.—A definite enunciation of the Republican policy in the matter of Philippine independence was delivered in the House on October 1 by Representative Mann of Illinois, the minority leader.

Mr. Mann's speech came as the single bright spot in a day of protracted general debate on the Philippine independence bill. He braved the executive embargo on the discussion of international questions by commenting with the greatest freedom on questions of international policy in the Pacific. Mr. Mann said in part:

"Only a few years ago Japan was opened to the world and modern civilization. The changes which have been made in Japan, the marvelous growth of her influence, are not to be equalled by any other nation, I think, in the history of the world.

"*The Awakening of China.*—Close to Japan, lying like a sleeping child of the world, is China, with her vast territory, with her immense population, and that which was going on in Japan a few years ago is now going on in China. The awakening of China is more marvelous, perhaps, than was the awakening of Japan, and as these great people in China arise to the civili-

zation of our modern days and engage in the manufacture of products we will enter on a series of competitive efforts with the Far East which have never yet been equalled in this world.

"The great population of China, we say, shall not be permitted to come to our shores. At the same time we say that China shall not be permitted to shut out our people or our goods. Such a position as we take cannot be abandoned by our people, but it can never be enforced in the long run without the power to enforce it.

"When China is awakened and the tendency comes which always comes to an awakened nation, thickly populated, to go out into the world either with her own people or with the production of goods made by her people, we will have a conflict on our hands which will last for many years, possibly for many centuries.

"And we who are now legislating, if we do not bear in mind possibilities not merely of to-day or to-morrow or 100 years from now—of the inevitable conflict, commercial or otherwise, which we will meet in the Far East, have forgotten the principles which ought to actuate us.

"*Far East and Far West.*—I have no doubt that it is as certain as the sun will rise to-morrow that a conflict will come between the Far East and the Far West across the Pacific Ocean. All that has taken place in the world during the history of the races up to now teaches us that avoidance of this conflict is impossible.

"I hope that it may be only a commercial conflict. I hope that war may not come. I hope there will be no conflict of arms, but I have little faith that in this world of ours people and races are able to meet in competition for a long period without armed conflict. A fight for commercial supremacy leads in the end to a fight with arms, because that is the final arbiter between nations.

"We command the Pacific Ocean with the land that we have on this side, with the islands that we possess in the sea and with the Philippines on the other side.

"Will we surrender our command? I say no; never.

"If we should let the Philippine Islands go to-day without a string tied to them they would belong to some other country within ten years, but if they could keep their independence for 25 or 50, or even 100 years, in the end they would be used against us in the inevitable conflict between competing races.

"*Opposed to Independence.*—I am opposed to giving the Philippine Islands independence. I do not believe we should grant independence to the Philippine Islands with a string tied to it. I had rather grant them absolute independence. I do not believe the example we are having in Mexico is any inducement to extend either directly or indirectly the so-called Monroe Doctrine to the Philippine Islands.

"We are having trouble enough now about a country where we say we cannot afford to let another nation enter; we are having trouble enough now in Mexico and with the other republics of the south without engaging in any other enterprises of this kind.

"Keep the Philippines under the flag of the United States and make them our friends. There is no advantage in having the Philippines in the event of war if they are unfriendly to us. Most people who get under our flag want to stay there. If we treat the Filipinos right they will want to stay there.

"Assuming that the Filipinos are capable of self-government I am in favor of giving the Philippine people the broadest liberty of self-government, retaining them under our flag. The objection I have to the pending bill is that it has too many restrictions and I shall move to strike out some of these restrictions.

"Give the Filipinos the widest liberty of action in local affairs if we keep them. We should give them a chance to see whether they can manage their own affairs and make them friends of the United States, so that in the

future when these conflicts will arise, we will have control of the Pacific and we will have warm, devoted American friends and citizens in the Philippine Islands on the other side of the Pacific, so that this country and our race may remain supreme on the fighting ground of the future, the Pacific.

"I am not sure I am in favor of a naval base there. I think if we are going to let them go, then let them go and let Japan or China or Germany or England take them, as is inevitable, and then we would know what we have got to fight.

"Who would propose to permit Japan to have a naval station in Mexico, or who would consent that England should transfer British Columbia to Japan? Would we consent? We would go to war in a minute. We would not let China or Japan have a base of supplies on this side of the Pacific.

"Now we have the Philippines and it is our duty, first to ourselves and second to those who come after us, that the islands should be kept under our flag and that we should make friends of the Filipinos."—*New York Sun.*

ADDRESS TO THE TIME-EXPIRED MEN OF THE 1ST REGIMENT, HEAVY ARTILLERY, JAPANESE ARMY, BY THE REGIMENTAL COMMANDER IN DECEMBER 1913. (Translated by Lieutenant J. W. Marsden, R. G. A.)

Appendix 1.—Précis of a speech made by the officer commanding 1st Regiment of Heavy Artillery to the men who had completed their Colour service. This speech was afterwards lithographed and a copy given to each man.

Instructions for men who are returning home on completion of their Colour service.

(Throughout the speech, the word translated "you" is, in the original "children.")

You have now all completed your training and have become efficient soldiers of the Empire. In whatever capacity you henceforth serve your country, you will look back on this day of returning to your homes as completing a stage in the history of your lives, and as a day of rejoicing. You will keep its lessons in your hearts when you return to the occupations of your homes. The warm welcome from your relatives and friends will increase the pleasure of your return.

Now that we part, I pray that you may prosper, and as a parting present, offer you some advice as set forth in the following instructions:

1. In modern war organization the number of active soldiers is small, but the number of reserve soldiers is great. By employing both active and reserve soldiers, the war organization of our army is completed. And, therefore, as a supplement to the active army, there exists, as I suppose you know, a Reserve Soldiers' Institution. (Zaigo gunjin kwai.) To-day you have completed your training in the active army, and are transferred accordingly to the main portion of the national army. But you will never have done with military service. I want to impress this upon you that you may fortify your characters accordingly.

2. The Spirit of the Imperial Rescript is not the exclusive possession of military men, but is the Spirit of Japan. You will, therefore, make the Spirit of the Rescript dominate your whole life, studying it carefully, and basing your ordinary conduct thereon. Make your lives pure, and offer them as a votive light to its Spirit. You will then without fail be worthy reserve soldiers. (Zaigo gunjin.)

3. After your return to your homes, you will strive your utmost for the good of the Zaigo gunjin kwai, which exists for the purpose of fostering the military spirit in our country. You must discourage frivolity, ostentation, and the dangerous principles which have recently shown a tendency to spread. By taking the lead in acting up to the Spirit of the Rescript, do your best to convert your countrymen to its principles of purity and honesty.

4. I will give you some instances of prevalent dishonest practices:

Building contractors swindle over the materials. Their men shirk their work when there is no likelihood of detection, so that the employer cannot relax his vigilance for a moment.

Many tradesmen, with lying speech and action, not only calmly do what is called "bargaining," but trade with spurious articles.

When selling vegetables, they place the finest in the front of the box, etc., and fill up the contents with rubbish.

During the late war some cruel frauds were perpetrated. I will give you some instances:

The people at home saved up their money in order to buy things for the relief of the soldiers at the front. Casks of "saké" had their contents extracted enroute and replaced by stones. The words "1st Masamune" were written on the casks, and the so-called wine was sent for the soldiers to drink. Tinned pickles were in some instances replaced by scrap metal. Cases of apples coming by train from the northeast, oranges coming by ship from the southwest, had their contents pilfered. This lack of honesty is more terrible than an infectious disease, and there is unlimited scope for you to exert your utmost strength in combating it.

Especially must you be on your guard against luxury and ostentation. Do not dress in a style above your income. At an inspection of reservists there are many who misbehave in this manner, and bring discredit on the Zaigo gunjin kwai. You must take well to heart the Rescript on Frugality, and save your country from luxury.

5. From to-day you resume your places among the men of your village or town. You will serve your country not only during the periods when called up for military training, but by being diligent at your ordinary business. To think that your business affords no scope for fitting yourselves for war as becomes the backbone of the national army is a misapprehension. The place where you pursue your daily avocation affords a splendid training ground. The tools which you use in your work are all arms and weapons for military training. Agricultural implements are spade, mattock, scythe; business implements are "soroban,"[1] ledger, scales; carpenters' tools are chisel, plane, adze. You must treat them with care, as if they were guns.

Well, with all these arms you must struggle daily with imaginary enemies. By imaginary enemies I mean hardships, adversities, and temptations. For instance, if others stay at home on account of the weather, you must go out bravely; if others cease work after reaping for three hours, you must go on for five or six hours; if others go two leagues away to buy cheaply, you must go three leagues; if others go out to their work at 5 a. m., you must go out at 4. In every way you must struggle to get ahead of the other men. If you meet with failure, you must put forth more strength, and break down all obstacles. If you faint under the battle, recite the Rescript in your heart and your courage will revive. When the temptation to luxury assails you, steel your heart. Do not dally with the enemy, for hesitation spells defeat.

Your life is thus a continual struggle. These are the real "maneuvers," and you will gain strength to defeat any enemy. You will be preparing yourself to face real bullets when confronted by overwhelming odds. I can thus rely upon you to do your duty at all times.

In the autumn maneuvers you were given two or three days of "Iro kyuka"[2] as a reward, but in the maneuvers of life there is no "Iro kyuka."

Your business prospering, and your confidence increasing, you will find rest for the body in good health. Your family, living in harmony, will prosper without ceasing, and increase thereby the prosperity of Japan, and you will by your good conduct strengthen the martial spirit of the nation. You must always remember that in proportion as a country becomes rich the necessity for an efficient army increases.

You have up to to-day been gaining knowledge of military affairs. To-morrow you return from this maneuver area, but you must continue these exercises. After three years of toil you have a short spell in which to

[1] Abacus.
[2] Holiday.

play before starting work. If bad thoughts should arise these will constitute No. 1 imaginary enemy, your "Blood Festival," your Battle of the Yalu. The first battle is more than ever important. I want to hear how you succeed with this imaginary enemy, so please tell me truly and exactly by postcard as soon as you can.

6. Your duty when called upon in time of national danger to come to the aid of your country is set forth in the preceding articles. The equipment for your maneuvers in the Battle of Life is your physical strength. If your bodily strength becomes weak, no matter how much your heart may be on fire, no matter how much you repress your tears, the enemy will break you up. While you are at home consider the importance of your physique. This can only be maintained by strict attention to hygiene. If you contract disease, your misfortune is handed down to posterity, and no repentance will then avail.

7. You will henceforward be responsible for setting the right example to your fellow-citizens, so that you may all, in times of national emergency, do your duty bravely and truly. And as a mark of such you will from time to time put on your uniform; remember that there is no more honorable dress than that.

If it were possible I should like to give you each a suit of uniform, but owing to present financial conditions I regret that I cannot do so. But a regulation has been issued that, from this year onwards, all soldiers will be sent back to their homes in uniform. I hope, therefore, that as you leave the gate of this "National Army School," namely, your regiment, and until you return auspiciously to your homes, you will observe this regulation.[1]

You must think well over my instructions, and take the lead in setting an example, especially to the young men of your village. It has been customary, even with parents of poor households, who have perhaps shed tears of blood in doing so, to prepare good clothes against their son's return from barracks. I hope this bad practice will cease. Here is an example of the "enemy" about which I have already spoken.

In conclusion I wish you all a safe return to your homes.

CURRENT NAVAL AND PROFESSIONAL PAPERS

NOTE.—Lack of space limits the scope of these references. Upon application, members of the Institute, who wish to investigate further, any naval or military topic, will be supplied with fuller references to current periodicals published in both the United States and foreign countries.

UNITED STATES

NORTH AMERICAN REVIEW. **September.**—Europe at Armageddon. **October.**—Fundamental Aspects of the War, by *R. G. Usher.*

ATLANTIC MONTHLY. **October.**—Reasons Behind the War, by *R. G. Usher.* Italy's Position, by *G. B. McClellan.*

INDEPENDENT. **October.**—Challenge of the Submarine, by *P. Benjamin.*

SCIENTIFIC AMERICAN. **September 19.**—How Great Britain trains her Military Aviators. An Automobile Radio-Telegraph Station for War Use. Tractor Biplanes for the U. S. Army. American Opportunity in a World Catastrophe. Wireless Communication and Aeronautics. European Field Artillery. **September 26.**—The Automobile of the Sea. The Effect of the Zeppelin Bombardment of Antwerp. **October 10.**—The Military Carrier Pigeon Photographer. Our Merchant Marine, Past, Pres-

[1] (The suit of uniform to be returned by post, or through the headquarters of the regimental district.)

ent and Future. Coaling a U. S. Battleship. The Parseval Airship Used by German Army. The Rumpler Military Monoplane. **October 17.**—Projectile Photography. Explosives. **October 24.**—Making War Photographs from Aeroplanes. Strategic Moves of the War.

SHIPPING ILLUSTRATED. **September 19.**—The Argentine Navy. **October 10.**—Antarctic Exploration Ship *Endurance*. **October 24.**—Panama Canal Shipping Facilities.

JOURNAL OF THE WESTERN SOCIETY OF ENGINEERS. **September.**—Panama Canal, by *A. S. Zinn* and *L. D. Cornish*. Universal Use of Electricity on the Panama Canal, by *D. P. Gaillard*.

ENGLAND

THE ENGINEERING MAGAZINE. **October.**—Price Consequences of the European War. The Part the Power Wagon is Playing in the Present European War. **November.**—Why Germany Needs Alsace-Lorraine. Motor Transportation in the European War.

THE NINETEENTH CENTURY AND AFTER. **October.**—The Logic of History, by *J. A. R. Marriot*. The Inner Meaning of the War, by the *Right Rev. The Lord Bishop of Carlisle*. The Floating Mines Curse: An Unsentimental Study, by *Sir Thomas Barclay, Vice-President of the Institute of International Law*. Our Nearest Neutral Neighbor and the War, by *J. W. Robertson-Scott*. The Humanists of Louvain, By *Professor Foster Watson*. Treitschke, by *Professor J. H. Morgan*. Germany To-day: Some Experiences and Impressions of a Civil Prisoner of War. by *R. S. Nolan;* The "Guiltless" German People, by *Brigadier-General F. G. Stone*. The Commercial and Financial Outlook: A City Man's Views: The Outlook at Home; The Outlook in Germany, by *H. J. Jennings*. Pacificism, Truth and Commonsense, by *G. G. Coulton*. The Awakening of Britain, by *Colonel F. N. Maude, C. B., R. E.*

THE FORTNIGHTLY REVIEW. **October.**—Armageddon—and after (1). Germany's Obsession, by *Sidney Whitman*. Our Invincible Sword Drawn from the Sea, by *Archibald Hurd*. Austria and the Sons of Zeruiah, by *Edith Sellers*. Russia and the War, by *Politicus*. Antwerp and the Scheldt, by *Demetrius C. Boulger*. Aircraft in the War, by *Claude Grahame-White*. The Attitude of Italy, by *Arthur E. P. Weigall*. The Courting of America, by *James Davenport Whelpley*. History of the War (purely military), by *A. M. M.*

EDINBURGH REVIEW. **October.**—Germanism and Prussianism, by *Sidney Low*. Germany and the Laws of War. The German Colonies, by *Sir H. H. Johnston, G. C. M. G., K. C. B.* The Red Cross, by *Henry C. Shelley*. The Future of China, by *J. O. P. Bland*. The War, *Editor*.

QUARTERLY REVIEW. **October.**—The Origins of the Present War, by *Chirol*. The Economic Aspects of the War, by *E. Crammond*. The First Two Months of War, On Land and at Sea, by *Lord Sydenham* and *Archibald Hurd*.

CONTEMPORARY REVIEW. **October.**—Napoleon and Moltke (A Strategical Study of the Present War), by *F. N. Maude*. Why Russia Went to War, by *E. J. Dillon*. British Trade and the War, by *L. D. C. Money*. The War and the Law, by *H. Spender*. Italy and the War, by *T. Okey*.

THE JOURNAL OF THE ROYAL ARTILLERY. **October.**—To consider the best methods of attack and defence against hostile aircraft by artillery in the field, and to suggest changes in materiel and tactics necessitated by the ad-

vent of flying machines. Fuze Setters. The Canadian Field Artillery. The German Siege Howitzers.

UNITED SERVICE MAGAZINE. **October.**—The Navy and the War, by *"Admiral."* Comments on the War on the Belgian Frontier, by *Colonel F. N. Maude, C. B.* The Great War between the Teuton and the Slav, by *Lieutenant-General F. H. Tyrrell.* The Soldier Sikh, by *Saint Nihal Singh.* Studies in Minor Tactics, by *A. F. B. D.* Signalling in the French Army, by *R. Raven-Hart.* Anglo-French Relations, by *Major-General T. F. Lloyd.* The Modern Military Rifle, by *Edward C. Crossman.* Progress in Aeronautics, by *Major H. Bannerman-Phillips.*

THE ENGINEER. **September 25.**—The Guns Used in the War. **October 2.**—The Shipping Trade and the War. **Ocober 23.**—Heavy Siege Guns.

ENGINEERING. **October 2.**—Aircraft in Warfare. **October 23.**—The U. S. Electrically-Propelled Fleet. Collier *Jupiter.*

FRANCE

LA VIE MARITIME. **October 25.**—La Marine pendant la guerre. Le rôle de notre marine militaire.

ITALY

RIVISTA MARITTIMA. **September.**—Gli avvenimenti navali nel conflitto europeo, by *R. Mazzinghi.* La condizione giuridica del canale di Panama, by *G. Laghezza.* La guerra delle nazioni, by *Illyricus.*

EUROPEAN WAR NOTES*

Compiled by LIEUTENANT C. C. GILL, U. S. Navy

GENERAL ARRANGEMENT

1. DIPLOMATIC NOTES.
2. NAVAL NOTES.
3. MISCELLANEOUS NOTES.

(Details of Land Operations are not included.)

[Events of international significance will be briefly chronicled in large type. Notes and comments bearing upon these events will be interspersed in smaller type. Addenda will be published in future issues to correct and complete this compilation.]

DIPLOMATIC NOTES

In the Belgium "Gray Paper" of Official Documents for the period from July 24 to August 29, 1914, the following are of special significance:

France's recognition of Belgian neutrality:

BRUSSELS, August 1, 1914.

Monsieur le Ministre.—I have the honor to inform you that the French Minister has verbally made to me the following communication:

"I am authorized to declare that in the event of an international conflict the Government of the Republic will, as it has always declared, respect the neutrality of Belgium. In the event of this neutrality not being respected by another power, the French Government, in order to insure its own defence, might be led to modify its attitude."

I thanked his Excellency and added that on our part we had without delay taken all requisite measures to have our independence and our frontiers respected. I am, etc.,

DAVIGNON,
Belgian Minister of Foreign Affairs.

Germany's first offer to Belgium:

NOTE HANDED IN ON AUGUST 2D AT 7 O'CLOCK P. M. BY HERR VON BELOW SALESKE, GERMAN MINISTER, TO M. DAVIGNON, MINISTER FOR FOREIGN AFFAIRS

BRUSSELS, August 2, 1914.

Imperial German Legation in Belgium. Highly Confidential

The German Government has received reliable information according to which the French forces intend to march on the Meuse, by way of Givet and Namur. This information leaves no doubt as to the intention of France

* Acknowledgment is made to A. F. Westcott, Ph. D., Instructor U. S. Naval Academy, for help given in making this compilation.

of marching on Germany through Belgian territory. The Imperial German Government cannot avoid the fear that Belgium, in spite of its best will, will be in no position to repulse such a largely developed French march without aid. In this fact there is sufficient certainty of a threat directed against Germany.

It is an imperative duty for the preservation of Germany to forestall this attack of the enemy.

The German Government would feel keen regret if Belgium should regard as an act of hostility against herself the fact that the measures of the enemies of Germany oblige her on her part to violate Belgian territory.

In order to dissipate any misunderstanding the German Government declares as follows:

1. Germany does not contemplate any act of hostility against Belgium. If Belgium consents in the war about to commence to take up an attitude of friendly neutrality toward Germany, the German Government on its part undertakes, on the declaration of peace, to guarantee the kingdom and its possessions in their whole extent.

2. Germany undertakes under the condition laid down to evacuate Belgian territory as soon as peace is concluded.

3. If Belgium preserves a friendly attitude, Germany is prepared, in agreement with the authorities of the Belgian Government, to buy against cash all that is required by her troops, and to give indemnity for the damages caused in Belgium.

4. If Belgium behaves in a hostile manner toward the German troops, and in particular raises difficulties against their advance by the opposition of the fortifications of the Meuse, or by destroying roads, railways, tunnels, or other engineering works, Germany will be compelled to consider Belgium as an enemy.

In this case Germany will take no engagements toward Belgium, but she will leave the later settlement of relations of the two states toward one another to the decision of arms. The German Government has a justified hope that this contingency will not arise and that the Belgian Government will know how to take suitable measures to hinder its taking place. In this case the friendly relations which unite the two neighboring states will become closer and more lasting.

Belgium's reply:

NOTE HANDED IN BY M. DAVIGNON, MINISTER FOR FOREIGN AFFAIRS, TO HERR VON BELOW SALESKE, GERMAN MINISTER

BRUSSELS, August 3, 1914. (7 o'clock in the morning.)

By their note of August 2, 1914, the German Government has made known that according to certain intelligence the French forces intend to march on the Meuse via Givet and Namur and that Belgium, in spite of her good will, would not be able without help to beat off an advance of the French troops.

The German Government felt it to be its duty to forestall this attack and to violate Belgian territory. Under these conditions Germany proposes to the King's Government to take up a friendly attitude, and undertakes at the moment of peace to guarantee the integrity of the kingdom and of her possessions in their whole extent. The note adds that if Belgium raises difficulties to the forward march of the German troops Germany will be compelled to consider her as an enemy and to leave the later settlement of the two states toward one another to the decision of arms.

This note caused profound and painful surprise to the King's Government. The intentions which it attributed to France are in contradiction with the express declarations which were made to us on August 1, in the name of the Government of the Republic.

Moreover, if, contrary to our expectation, a violation of Belgian neutrality were to be committed by France, Belgium would fulfill all her international duties, and her army would offer the most vigorous opposition to the invader.

The treaties of 1839, confirmed by the treaties of 1870, establish the independence and the neutrality of Belgium under the guarantee of the powers, and particularly of the Government of his Majesty the King of Prussia.

Belgium has always been faithful to her international obligations; she has fulfilled her duties in a spirit of loyal impartiality; she has neglected no effort to maintain her neutrality or to make it respected.

The attempt against her independence with which the German Government threatens her would constitute a flagrant violation of international law. No strategic interest justifies the violation of that law.

The Belgian Government would, by accepting the propositions which are notified to her, sacrifice the honor of the nation while at the same time betraying her duties toward Europe.

Conscious of the part Belgium has played for more than 80 years in the civilization of the world, she refuses to believe that the independence of Belgium can be preserved only at the expense of the violation of her neutrality.

If this hope were disappointed the Belgian Government has firmly resolved to repulse by every means in her power any attack upon her rights.

The Imperial Chancellor Bethmann-Hollweg's reference to the German occupation of Belgium in a speech before the Reichstag, August 3:

Our troops have occupied Luxemburg and have perhaps already penetrated into Belgium. This is contrary to the provision of international law. It is true that France has declared at Brussels that she was resolved to respect the neutrality of Belgium as long as her adversary respected it. But we knew that France held herself in readiness to invade Belgium. France could wait. We could not. A French attack on our flank in the region of the Lower Rhine might have become fatal. That is how we have been forced to ignore the just claims of the governments of Luxemburg and Belgium. The injustice which we are committing in this fashion will be made good by us as soon as we shall have attained our military objects.

Any one who is threatened to such an extent as we are and who is fighting for his supreme welfare can only think of means of hacking his way through; we find ourselves side by side with Austria.

Germany's second offer to Belgium (transmitted August 9, through the Dutch foreign office, following the refusal of the American Minister at Brussels to undertake the negotiations owing to lack of instructions from Washington):

The fortress of Liège has been taken by assault after a courageous defence. The German Government very deeply regret that, in consequence of the attitude of the Belgian Government towards Germany, bloody conflicts have arisen. Germany is not coming to Belgium as an enemy, it is only by the compulsion of events that she has been compelled, owing to military measures taken by France, to take the grave decision to enter Belgium and to occupy Liège as a point of support for her subsequent military operations. After the Belgian Army, by its heroic resistance against greatly superior forces, has maintained the honor of its arms, the German Government request the King of the Belgians and the Belgian Government to spare Belgium the further horrors of war. The government are ready to make any agreement with Belgium that is consistent with its conflict with France. [By an error of translation, later corrected, *the arrangements* was substituted in the original document for *its conflict.*] Germany once more gives the solemn assurance that she has no intention of appropriating Belgian territory and that such an intention is far from her thoughts. Germany is still ready to evacuate Belgium as soon as the state of war will permit of her doing so.

The Ambassador of the United States here [Berlin] is in agreement with this attempt at mediation by his Brussels colleague.

Belgium's reply:

TELEGRAM ADDRESSED BY M. DAVIGNON, MINISTER FOR FOREIGN AFFAIRS, TO BARON FALLON, BELGIAN MINISTER AT THE HAGUE.

BRUSSELS, August 12, 1914.

Please hand the following telegram to the Minister for Foreign Affairs: The proposal made to us by the German Government reproduces the proposition which they had formulated in the ultimatum of August 2. Faithful to her international duties, Belgium can only repeat her reply to this ultimatum, more especially as since 3d of August her neutrality has been violated, a terrible war has been carried into her territories, and the guarantors of her neutrality have loyally and immediately responded to her appeal. (Signed) DAVIGNON.

The following discussion of Belgian Neutrality, by Prof. John W. Burgess of Columbia University, appears in *The Vital Issue*, under date of September. 11:

So much has been said about "Belgian Neutrality," so much assumed, and it has been spoken of as *such a sacred thing*, that it may be well to examine the basis of it and get an exact idea of its scope. It is not a moral question. It is a question of truth. It is a question purely of international agreement and we must find for it such an agreement and the agreement must not have been abrogated nor have become, by change of conditions, obsolete. Of course by the term "Belgian Neutrality" is meant guaranteed neutrality, not simply the "general neutrality of all states not at war" at a time when other states are at war.

On the 19th day of April, 1839, Belgium and Holland, which had from 1815 to 1830 formed the United Kingdom of the Netherlands, signed a treaty of separation from, and independence of, each other. It is in this treaty that the original pledge of Belgian neutrality is to be found. The clause in the treaty reads: *"Belgium in the limits above described shall form an independent neutral state and shall be bound to observe the same neutrality towards all other states."* On the same day and at the same place, London, a treaty, known in the history of diplomacy as the *"Quintuple Treaty,"* was signed by Great Britain, France, Prussia, Austria and Russia, approving and adopting the treaty between Belgium and Holland. A little later, May 11, the German Confederation, of which both Prussia and Austria were states, also ratified this treaty.

In the year 1866 the German Confederation was dissolved by the short war between Prussia and Austria. In 1867 the "North German Union" was formed, of which Prussia was the largest state.

Did these changes abrogate the guarantee of the Treaty of 1839, or make it obsolete? The test of this came in the year 1870, at the beginning of hostilities between France and the North German Union. Great Britain, the power most interested in the maintenance of Belgian neutrality, seems to have had considerable apprehension about it. Mr. Gladstone, then Prime Minister, said in the House of Commons on the 2d of August, 1870: "I am *not able to subscribe* to the doctrine of those who have held in this House what plainly amounts to an assertion that the simple fact of the existence of a guarantee *is binding on every party to it*, irrespective altogether of the particular position in which it may find itself at the time when the occasion for acting on the guarantee arises."

Acting on this view, the British Government then sought and procured from the French Government, and from the government of the North German Union separate but identical treaties, ratified on the 9th and 26th of August, 1870, respectively, guaranteeing the neutrality of Belgium *during the period of the war between France and the North German Union (the so-called Franco-Prussian War), which had just broken out, and for one year from the date of its close.* In these treaties Great Britain limited the

possible operation of her military forces in maintaining the neutrality of Belgium to the territory of the state of Belgium.

These treaties expired in the year 1872, and the present German Empire has never signed any treaty guaranteeing the neutrality of Belgium. If the Treaty of 1839 had become so unreliable in 1870 as to require, in the opinion of the British Government, the new treaties in 1870 in order to make sure of the guarantee of Belgian neutrality, what shall we say about it in 1914, *42 years after these treaties of 1870 have expired,* and after the North German Union, which was party to them, has given way to the present German Empire?

Finally, *The Hague Conference of 1907* drafted a convention which reads:

"The territory of neutral powers is inviolable. Belligerents are forbidden to move troops or convoys of either munitions of war or supplies across the territory of a neutral power."

Great Britain, Germany, Austro-Hungary and Italy refused to sign it and did not sign it. Russia was not represented.

Perhaps we may now somewhat more clearly understand, why the German Chancellor referred to the guarantee of Belgian neutrality as a "scrap of paper." At any rate, these facts, taken together with the facts that *Great Britain refused to pledge her own neutrality in the present war even on the condition that Germany would agree not to move her troops through Belgium and not to attack the north coast of France, and declined to formulate any conditions upon which she would remain neutral,* clearly reduce England's much vaunted altruistic reason for entering upon this war to a diplomatic subterfuge.

To similar arguments in Bernard Shaw's "Common Sense about the War," Arnold Bennett makes the following reply:

But Mr. Shaw is not content with arguing that the Belgium point was a mere excuse for us. He goes further and continually implies that there was no Belgium point. Every time he mentions the original treaty that established Belgian neutrality he puts after it in brackets, [date 1839], an obvious barrister's device, sarcastically to discredit the treaty because of its age. He omits to say that the chief clause in the treaty contains the word "perpetually." What is worse, he infers that by the mere process of years, as Belgium gradually made herself, civilized herself, enriched herself, and increased her stake in the world, her moral right to independence and freedom instead of being strengthened was somehow mysteriously weakened. The theory is monstrous, but if he does not mean that he means nothing.

Further, he says that in 1870 Gladstone could not depend on the treaty of 1839 and resorted to a special temporary treaty not now in force, and that, therefore, technically the validity of the 1839 treaty is extremely doubtful. The treaty of 1870 was, indeed, temporary, except in so far as it confirmed the treaty of 1839. Article 3 of the treaty of 1870 says it shall be binding on the contracting parties during the continuance of the war and for 12 months after, and then proceeds "and on the expiration of that time the independence and neutrality of Belgium will, so far as the high contracting parties are respectively concerned, continue to rest as heretofore on the quintuple treaty of 1839" (textual).—*N. Y. Times,* 11/18.

The following excerpt from a letter written by the Belgian Chargé, at St. Petersburg, July 30, and found by the Germans in the archives at Brussels, is printed in Germany as evidence of England's responsibility for the war. The inference is that had England stated definitely that she would or would not support Russia, the war might have been averted:

LEGATION OF BELGIUM AT ST. PETERSBURG

July 30, 1914.

795 | 402

Political Situation

Monsieur le Ministre.—The Ambassador of Germany declared this morning that he was at the end of his efforts for conciliation, which he had not ceased to make since Saturday, and that he had scarcely any more hope. I have just been told that the Ambassador of England has expressed himself in the same sense. Great Britain as a last resort has proposed arbitration. M. Sazonoff replied: "We have proposed that ourselves to Austria, and she has refused it." To the proposition of a conference Germany has replied with the proposition of an entente among cabinets. One can truly ask one's self whether the whole world does not desire war and is trying merely to retard its declaration a little in order to gain time.

England began by allowing it to be understood that she did not want to be drawn into a conflict. Sir George Buchanan (British Ambassador) said that openly. To-day one is firmly convinced at St. Petersburg—one has even the assurance of it—that England will support France. This support is of enormous weight, and has contributed not a little to give the upper hand to the war party.

The Government of Russia has allowed free rein in the last few days to all pro-Servian manifestations and manifestations hostile to Austria, and has not tried in any way to suppress them. There have still been created differences of opinion in the bosom of the Council of Ministers, which assembled yesterday morning; the publication of the mobilization was delayed. But since then there has been brought about a change of view, the war party has taken the upper hand, and at 4 o'clock this morning the mobilization was made public.

The army, which feels itself strong, is full of enthusiasm and relies on great hopes based on the enormous progress that has been achieved since the Japanese War. The navy is so far from having realized the program of its reconstruction and its reorganization that it can scarcely enter into the matter of reckoning. It is probably there that the motive lies which gives such great importance to the assurance of England's support.

As I have had the honor to telegraph to you to-day, all hope of a pacific solution seems remote. That is the opinion of diplomatic circles.—*N. Y. Times,* 10/7.

OCCUPATION OF GERMAN COLONIES.—On **August 15,** the German possession of Togoland, on the "gold coast" of West Africa, fell into the hands of the Allies. On **August 30,** Apia and the German islands in the Samoan group surrendered to New Zealand forces. On **September 11** an Australian expedition took possession of the German headquarters for the Bismarck Archipelago Protectorate; and on **September 24,** of the seat of government in Kaiser Wilhelm's Land, in northern New Guinea. With the seizure by the Japanese of the Marianne (Ladrones) and Marshall Islands (announced **October 21**) and the East and West Caroline Archipelagoes, and the fall of Tsingtao (**November 7**), Germany has lost control of all her possessions in the Pacific and Far East. An Anglo-French expedition has also forced the surrender of Duala, in the Cameroons (**September 27**); and a

British force has seized the wireless station of Luderitzbucht in German Southwest Africa.

The island of Neu Pommern, on which Herbertshohe, the capital of the former German possessions in New Guinea, stands and the Bismarck Archipelago, were originally known as New Britain, a name which will now doubtless be resumed. It fell into the hands of the Germans in November, 1884, and their presence both in these islands and on the adjoining territory of New Guinea has ever since been regarded as a menace by Australian public opinion. At first the German New Guinea Company administered the new possessions, but on April 1, 1899, the protectorate was transferred to the Colonial Office in Berlin. New Britain (Neu Pommern) itself has an area of 9500 square miles, or more than nine times the size of the county of Durham, but its population is inconsiderable, that of the whole archipelago being only 188,000, of whom fewer than 409 were Germans.

Kaiser Wilhelm's Land forms the northern part of southwest New Guinea, and has an area of 70,000 square miles, with a population of 300,000, including 700 whites. It was declared a German protectorate in 1884.

The Marianne or Ladrone (meaning thieves) are a group of islands in the Pacific, 1350 miles east of the Philippines, all of which are German possessions with the exception of Guam, which is owned by the United States. There are 14 islands in all, but only seven are inhabited. The northern ten are of volcanic origin and the remainder are coralline in construction and fringed with coral reefs. The climate and soil lend themselves admirably to agriculture, coffee, sugar, cotton, tobacco, cocoa, sweet potatoes, and cocoanuts being among the products. In 1899 Germany paid Spain approximately $4,000,000 for this group.

THE GERMAN COLONIES.—Up till the 15th of August last, when Togoland fell, Germany possessed in Asia, Africa, and Oceania a Colonial Empire and spheres of influence—areas of special privilege—covering 1,484,944 square miles (1,128,640 square miles in 1913). She was regarded as the dominant power in European Turkey, and, except in Armenia, her influence was pre-eminent throughout Asia Minor, and also at Antioch, Aleppo, Skanderūn, and on the Euphrates and the Tigris. Her ally Austria had a semi-protectorate over Albania, with the right to maintain there as sovereign a Prussian Prince. In northern China Germany ruled and administered 400 square miles, and enjoyed monopolist concessions over the whole province of Shan Tung. She possessed the Mariana and Caroline archipelagos and 70,000 square miles of northeast New Guinea, together with the Bismarck Archipelago (20,000 square miles), and the northern Solomon Islands (4200 square miles). In the long-coveted archipelago of Samoa she possessed nine islands and islets out of 14. In Africa she controlled 1,032,280 square miles, namely 291,950 square miles in the Kamerun (including more than 100,000 square miles obtained from France in 1911), 33,700 square miles in Togoland (a possession wedged in between the British Gold Coast and French Dahomey), 384,180 square miles in German East Africa, and 322,450 square miles in German Southwest Africa.

In addition to these actual possessions she had recently obtained from Great Britain public or private acknowledgments of her special commercial —and it may be political—interest in a large portion of the Portuguese African possessions, and an admission that she was a fourth party with co-equal interests in the affairs of Liberia (where, by-the-bye, her newly founded cable and wireless stations have been a menace to British ships in the Atlantic). Further, Sir Edward Grey had stated publicly that any schemes of German aggrandizement in the Congo Basin, provided they did not interfere with the vested British interests in the south of that region.

or did not involve aggression against other powers, would not be opposed by the British Empire. In short, Germany, joined with her confederate Austria, was in a very fair way towards building up a German Overseas Empire, which, combined with spheres of influence in Africa, the Near East, and the Far East, might have aggregated a total area of 2,000,000 square miles of highly productive lands reserved for Austro-German exploitation, reservoirs of raw products for German industries, markets for the purchase of German wares.

Nor was this the end of Germany's opportunities of expansion. For 20 or 30 years she had been permeating Belgium with her capital, her enterprise, and her racial influence; and slowly winning over a party in Holland to the toleration of a close alliance, if not a fusion, with the German Empire. The German colonization of Brazil was proceeding apace, and German interests in tropical America generally made a good third after those of Great Britain and the United States. It was only in the Near East that her expansionist schemes had sustained a check. This occurred in the years 1911 to 1913. In the first place, Italy, alarmed at the well-founded report of German designs on Tripoli (an Austro-German chartered company was being promoted to which an immense concession was to be granted by the Porte over Tripoli and Barka), made use of grievances which Turkish policy fatuously supplied and took possession of all that portion of North Africa unclaimed by France in Tunis and England in Egypt. This action placed Germany in a peculiar dilemma; for when Turkey appealed to her for help she found herself impotent. She could not strike at Italy without injuring herself and Austria, and had to stand by whilst Italy took possession not only of Tripoli and Barka but also of Rhodes and the Dodecanese, and proceeded to demand a share in the development of southern Asia Minor. That was only the beginning of the trouble, for Italy, in order to overcome Turkish resistance in North Africa, roused Greece; and Greece organized the Balkan Alliance. The ensuing Balkan War reduced Turkey in Europe to an area of about 10,800 square miles, and interposed between Austria-Hungary and Constantinople a formidable barrier of warlike peoples.

The irritation of Germany was only partly appeased by the international recognition of her privileged position in what remained of Turkey. She obtained the command of the Turkish army, and the control of the Baghdad Railway and all that depended thereon. She had, it is true, from money market considerations, to accord an unwilling recognition to French concessions in Syria and to Russo-French interests in Armenia. But it was understood that she had come to terms with England, and had virtually been able to carry her influence not merely to Baghdad; but to Basra, within sight of the Persian Gulf.—Excerpts from the German Colonies by Sir H. H. Johnston, *The Edinburgh Review,* October.

(This article continues to speculate at length on the probable redistribution, after the war, of colonial commercial and political interests among the powers of the world.—C. C. G.)

September 5 the Triple Entente made the following significant agreement regarding peace terms:

DECLARATION.—The undersigned duly authorized thereto by the respective governments hereby declare as follows:

The British, French and Russian Governments mutually engage not to conclude peace separately during the present war. The three governments agree that when terms of peace come to be discussed no one of the Allies will demand terms of peace without the previous agreement of each of the other Allies. In faith whereof the undersigned have signed this declaration and have affixed thereto their seals.

Done at London in triplicate the 5th day of September, 1914.

E. GREY,
His Britannic Majesty's Secretary of State for Foreign Affairs.

PAUL CAMBON,
Ambassador Extraordinary and Plenipotentiary of the French Republic.

BENCKENDORFF,
Ambassador Extraordinary and Plenipotentiary of His Majesty the Emperor of Russia.

September 10 the nations of the world were formally notified by Turkey of the abrogation of the capitulations.

"Capitulation" is a diplomatic term to designate certain Ottoman state papers which were reduced to chapters (*capita*). They are the articles by which, from time to time, the Sublime Porte has granted to foreigners in Turkey certain immunities, privileges, and extra-territorial rights. Some of these Capitulations go back 800 years. At the capture of Constantinople in 1453 Mohammed II, in order to check the exodus of the Christian population, and with it the leaders of commerce, craftsmanship, art, and education, decreed for these classes unusual privileges and permitted colonies of resident foreigners to continue forms of local self-government. These privileges included certain valuable exemptions from taxation, freedom from military service, and the exercise by the ecclesiastics not only of religious control but also of important civil functions within the limits of their own communions, whether of the Catholic, Greek, Jewish, Armenian, or other faiths, including the Protestant at a later date. To these privileges there have subsequently been added others, such as the right of subjects of favored nations to immunity from the procedure of Turkish law in criminal cases, and to trial in a consular court of their own country. Foreign nations have been allowed to maintain in Turkey extra-territorial post-offices with the management of which Turkey has nothing to do and from which she can derive no revenue, each nation using its own stamps for letters going out of the country. The United States has from time to time voluntarily yielded some of these extra-territorial rights at the request of Turkey and as a matter of fairness; but the European countries, as a rule, have been loth to release Turkey from any of her engagements without a substantial *quid pro quo*. Often the "*quid*" demanded in the shape of commercial or diplomatic advantages has been worth more than the "*quo*." —F. D. GREENE, *Outlook*, 9/23.

AMERICAN INTERESTS IN TURKEY.—No European power has a greater interest in the maintenance of justice and peace in Turkey than has the United States.

Americans have in Turkey several hundred educational and philanthropic institutions, including 10 colleges, 20 high schools, and 12 hospitals, all filled to the doors. These institutions have been firmly established at important points at an expense of many millions of dollars, and they are maintained by hundreds of American citizens residing in Turkey. These men and women have gone thither with the full assent of the Turkish Government, and have purchased their property and constructed their buildings with its direct authorization. Their object is not to make money out of the people, but to render disinterested service to the people. They are not the propagandists of a hostile or a novel religion. Their schools and colleges are not organized to turn Moslems into Christians, but to imbue the people of Turkey with that spirit of justice and good will which is the essence of Christianity. They are Christian in the same sense in which

Harvard, Yale, Princeton, Vassar, and Bryn Mawr are Christian. Though it is stated on good authority that there are in these schools now at least a thousand of the Moslem faith, the pupils are generally Christians, not Moslems. The service which has been rendered by these institutions to Turkey cannot be estimated. The direct influence has been great, but the indirect influence much greater. As a result of their establishment the whole educational system of Turkey has been recreated and reorganized, and education has been modernized. While Turkey has no such universities as those of Russia, its public school system for the education of the people is far superior.—*Outlook*, 9/23.

November 5, following hostile acts of the Turkish fleet in the Black Sea, Great Britain and France made formal declaration of war on Turkey.

The British proclamation of war with Turkey reads as follows:

Owing to hostile acts committed by Turkish forces under German officers, a state of war exists between Great Britain and Turkey from to-day, and all proclamations and orders in council issued with reference to the state of war between Great Britain and Germany and Austria shall apply to the state of war between Great Britain and Turkey.

The French Foreign Office issued the following note:

"The hostile act of the Turkish fleet against a French steamer, causing the death of two Frenchmen and serious damage to the ship, not having been followed by the dismissal of the German naval and military missions, the measure whereby Turkey could disclaim responsibility, the government of this republic is obliged to state that, as a result of the action of the Ottoman Government, a state of war exists between France and Turkey."

MENACE OF MOHAMMEDAN REVOLT.—The gravest possibility which Turkey's action raises is the threat of a Mohammedan revolt. Germany is the one European power which has no Moslem subjects. If the Sultan, who claims to be the Commander of the Faithful—a claim which is not unanimously accepted in Islam—should proclaim the Holy War, and if all the far-flung followers of the Prophet should answer his call, it would be a blow, a stupendous blow, to the Allies.

A general Pan-Islamic revolt would mean war on the Unbeliever throughout North Africa, from Morocco to Suez and well down towards the equator; it would mean isolated massacres of missionaries and traders in Asia Minor, an uprising against Russia in Persia and Turkestan, and an outbreak in India comparable with the Sepoy Mutiny. This whirlwind would equal in effect the annihilation of General Joffre's army in France.

The entire success of the grandiose dream of Pan-Islamism is extremely improbable. But its success in some details is probable. There is bitter rivalry in India between the Mohammedans and Hindus. In a religious war the Hindus—and they greatly outnumber the Mohammedans—would probably help the English. Japan could be counted on for active help if necessary. In the settled French colonies of North Africa, Tunis and Algeria, there is little chance of revolt. The native "notables" have made peace with the conquerors. Many of them wear the Cross of the Legion of Honor. Anti-French sentiment is widespread among the natives of the lower classes, but they are inarticulate, unorganized, and illiterate. If the Sultan proclaimed the *Jehad*, it would be months before the news reache the masses.

In Egypt the danger is greater because there the disaffected elements belong to the educated class, the descendants of the native autocracy, who under English rule, have lost most of their old-time privileges. Lord

Kitchener knows more about Egypt than any other man alive, and it is hard to believe that he has neglected the necessary precautionary measures. The censorship in Cairo is at least as severe as in London. The half-dozen Arabic newspapers run by the government are doubtless recounting English victories. And the Nationalist press, which enjoys a limited independence, has no news the government wishes to suppress.—ARTHUR BULLARD, *Outlook,* 11/11.

For the Turk it is clear the final hour has come—defeated he must now quit Europe, go back to Anatolia, conceivably lose Arabia, Syria, the Valley of the Euphrates, certainly surrender his half of Armenia. Even the primacy in the religious hierarchy of Islam may be lost to the Sultan. Victorious, he may hope to linger a little longer, to fortify himself on the jealousy of great nations for a few more years. But his choice is plainly between immediate ruin if Russia should conquer and ultimate dissolution if the Pan-German dream is realized. He has naturally and quite reasonably decided to face the immediate peril.—*N. Y. Sun,* 11/3.

So far Turkey's participation in the war appears to have been productive of few results of material importance. The wildest rumors arrive via Berlin and the wireless station at Sayville, as, for instance, the intelligence that the Khedive of Egypt, who is at present in Constantinople, and, *nolens volens,* is likely to remain there, is himself about to lead the army of invasion into Egypt, and that the Ameer of Afghanistan has declared war on Russia and Great Britain. On the other hand, by way of Petrograd and London have come reports of dissension in the Turkish capital and of a revolt of the garrisons there and in Adrianople. The Sultan has issued a proclamation to the army and navy in which he accuses Great Britain, France, and Russia of having instigated the war upon Turkey and declares that "not only the fate of our own country but the fate of 300,000,000 Moslems depends on your victory."—*N. Y. Nation,* 11/19.

ITALY AND THE WAR.—Italy, in her foreign relations, was once cynically compared by Bismarck to a *bella donna* at a ball who gives her hand now to one partner, now to another. Never in the course of her history has that fair lady's favor been solicited so pressingly; never have so many enticing and flattering offers been made to her as during the past two months of European convulsion. And never, be it said, has Italy maintained an attitude more calm, more dignified, more self-possessed. Despite irritation (the report is current at Rome that the Emperor William despatched a telegram to the King of Italy couched in the following terms: "Victor or vanquished, I will never forget thy perfidy.") at Italy's refusal to help her partners in their titanic struggle, they still profess to regard the Alliance as intact, and Austria, asserted in an inspired article in the official *Fremdenblatt* of August 27, that "if the Italian Government, after carefully weighing the reasons for and against, has arrived at the conclusion that it would be more opportune for her to remain neutral, such decision by no means implies the end of the Triplice, whatever may have been whispered in Italy and elsewhere. The bond between the three powers exists, and will continue to exist even after the war, since it corresponds to their interests, and an Austro-German defeat—if, indeed, anyone is credulous enough to believe in that possibility—would be a national disaster for Italy, whereas a victory would mean the victory of an orderly and modern element of culture in Europe, and would be therefore to Italy's interest." A similar line has been followed by the *Reichspost,* and also by the *Kölnische Zeitung* and other officially inspired German papers.

Although the terms of the Alliance have never been made public—and there have been Italian Foreign Ministers who were ignorant of its precise conditions—enough is known of its general tenor, from official speeches and

inspired communications to the press, to prove that the famous compact was, so far as Italy was concerned, non-aggressive in character, an instrument of defence against a possible attack by France, and, in its later aspect, an act of mutual renunciation on the part of Italy and the Dual Monarchy of any aim of territorial aggrandizement in the Balkans or in Albania. And this, it is generally believed, in return for an agreement on Italy's part to help Germany if she were attacked by France; or in the event of Austria-Hungary being assailed by Russia, involving the intervention of Germany and a consequent counter-attack by France, Italy was also to stand by her allies. The Alliance, said Count Robilant, on its renewal in 1887, surrounds Italy with a circle of iron, so that no power would dare to insult her dignity. It implied, said the Marquis San Giuliano in December, 1912, a mutual renunciation of territorial ambition, or of occupation, or partition, of territory in the Balkans. Each (Italy-Austria) has eyed the other in Albania with bitter jealousy, and incidents in the competition for nursing the new Albanian State have bordered on the ludicrous. More than once in comparatively recent times the two countries have been on the verge of war, and a call to arms for Austria's sake in a war provoked without Italy's consent and against her will and interests would have swept away the Italian Government in a tempest of popular indignation.

But other considerations of a more material nature have doubtless swayed the royal counsels at Rome. Italy is essentially a Mediterranean power. With a coast line, including the islands, of 4300 miles, to which have been added nearly another 1000 miles in North Africa (not to speak of Rhodes and the islands of the Ægean), all singularly open to an attack by a hostile fleet, it is inconceivable that Italy could have viewed without grave apprehension the danger of offending the allied powers, whose fleets have swept the Middle Sea from Gibraltar to Malta, from Malta to the Dardanelles. Nor is it credible that French and British squadrons would have entered the Straits of Otranto and steamed up the Adriatic to bombard Cattaro, while the Italian fleet lay in their rear at Taranto, with out a previous understanding with Rome. Moreover, Italy has no coal-fields; imported coal is vital to her industries and to the mobility of her fleet, and of the 9,600,000 tons imported in 1911, no less than 8,770,000 tons came from the United Kingdom. (Excerpts from "Italy and the War" by T. O. Key, *The Contemporary Review*, October.)

HOLLAND AND THE WAR.—Excerpts from an article by J. W. Robertson-Scott in the October *Nineteenth Century and After:*

But it is imperative that Germany shall not be fed *via* Holland if we can prevent it without infringing the rights of a neutral state. As to goods produced in Holland, the Dutch are their own masters. As to goods produced by ourselves we are also free to do as we like. But as to the goods of a third neutral country, there is a difficulty. We are bound by international law and the Dutch are bound by the Rhine Convention of 1869. The only way seemed to be to ask the Dutch Government to guarantee that particular imports should not be exported to Germany. But the Dutch Government is bound by the Rhine Convention to keep the Rhine (which means the harbor of Rotterdam) open for goods in transit, and to offer no impediment to them by tolls or otherwise. An undertaking to prohibit export to Germany could not cover various goods which, in ordinary circumstances, only pass through Holland in transit and are not reckoned as import and export. And the British Government, which is at war on behalf of treaty observance, would be reluctant to ask from Holland an undertaking which would mean a violation of the Rhine Convention, to which she and Germany are signatories.

What the Dutch Government has promptly done, and it is a very substantial token of good will, is to agree to set up in our interests a kind of national store. Recognizing that it has to meet and dispel feelings of

distrust, however unfounded, it will itself purchase all cargoes or parts of cargoes, consigned to Holland, which we might regard as conditional contraband. In the future, therefore, we shall not regard as contraband anything bought by the Dutch Government.

How the Dutch Government will deal with its importers is its own affair. It is probable, however, that it will hand over the goods to importers on their making a deposit by way of guarantee that the goods shall not reach Germany. That the purchased cargoes will not reach Germany we may trust (1) the honor of the Dutch Government, and (2) its list of articles the export of which from Holland has been forbidden—in most cases from the 4th of August:

Horses.	Cotton (raw and yarn since Sept. 4).
Hay and straw.	Salt.
Oats.	Sugar (from Sept. 7).
Wheat and wheat products.	Pit props.
Barley.	Surgical instruments.
Rye (allowed Aug. 12-18).	Acetone.
Maize (since Sept. 3).	Sulphuric acid.
All cattle foods.	Saltpetre.
Rice (since Sept. 3).	Liquid fuels.
Beans and peas.	Motors and parts.
Leather and hides.	Motor cycles.
Coal and coke.	Carriages.

But, it may be said, how about cargoes or parts of cargoes openly consigned to Germany *via* Holland? Under the Rhine Act Holland cannot stop them. The answer is that it is our business, and we shall make it our business, to stop them on the high seas.

The writer's conclusion is that Holland is doing her best to maintain strict neutrality, in spite of keen sympathy for Belgium and a general feeling that her ultimate interests lie with the Allies. "Every level-minded Dutchman must know," said a Dutch friend to me, "that with England, France, and Russia beaten, Holland would become a mere Bavaria in the German Empire. The right side for us is the Allies' side. If we side with Germany, we lose our most valuable possession, the Indies, at once, to England."

ECONOMIC ASPECTS OF THE WAR.—The October *Quarterly Review* has a noteworthy article on this subject by the English statistician Edgar Crammond, especially valuable in view of the vital part that finance will ultimately play in the war.

Speaking of London as "the center of the international financial system," and of New York as "the only possible rival," he says:

"America probably owes the United Kingdom in one shape and another 600,000,000*l.*; and the supreme test of New York's financial strength will be applied in the course of the next few months, when London attempts to move an appreciable portion of her credits to this side of the Atlantic at a period when in all probability Paris and Berlin will also be trying to do the same with their credits in New York.

"Indications are not wanting that New York bankers and financiers view with disapproval the withdrawal of gold coin from the states; and, if any embargo is placed upon the fulfilment by America of her indebtedness to Europe it would be fatal to any pretensions on her part to become the monetary center of the world. On the whole there is every reason to believe that London will be able to maintain her position. Our internal financial system has recovered from the first shock of war in a truly marvelous fashion.

"Our shipping industry has been placed in a sound position to meet all the exigencies of the war; and if we keep the sea we shall also, in all

human probability, maintain our place as the financial center of the world. The importance of our being able to do this cannot be exaggerated. Not only does it bring us in normal times a profit of at least 50,000,000*l.* per annum in respect of our services in financing the trade of the world, but it also gives our manufacturers a commanding position in the markets of the world. In the course of the next twelve months we shall in all probability lose the bulk of our earnings, say 50,000,000*l.*, from this source; but, if we are able to resume our place, the loss of this income need not be regarded too seriously—it will quickly be made good after the war."

According to Mr. Crammond, the depression in British commerce following the outbreak of hostilities has been overcome partly by government insurance of ships and cargoes, but chiefly by the concerted measures of the Admiralty and Foreign Office for the protection of over-seas trade.

"At the present time there is happily little reason to fear that it will be necessary to transfer British shipping to neutral flags; and, so far as it is possible to form a conclusion at this early stage of the war, the only influence which it will exercise upon our shipping industry will be to reduce the volume of sea-borne commerce and consequently the amount of our earnings. A return published at the end of September showed that, whereas the British shipping detained and captured amounted to 229,000, the German shipping detained and captured amounted to 1,140,000 tons, or say, one-fourth of the German mercantile marine. Under normal conditions it is estimated that the world stands to pay us about 100,000,000*l.* per annum for our services as carriers; and it is quite conceivable that in the course of the next twelve months the war may cause our income from this source to be reduced perhaps to one-half, or, say, 50,000,000*l.*"

Considering the ultimate resources of England and Germany, Mr. Crammond gives the following table of British investments abroad, and notes that about 95.6 per cent of these are "in countries remote from area of conflict" and not likely to suffer destruction or even partial damage. The table includes only the capital invested in colonial or foreign loans and in public undertakings or companies. The private investments abroad he would estimate at 10 per cent more, or about 355,000,000*l.*

BRITISH DOMINIONS, COLONIES, AND POSSESSIONS

India (including Ceylon)	£447,000,000
Australia and New Zealand	408,000,000
Africa	401,000,000
Canada	423,000,000
Other British Possessions	91,000,000
Total	£1,770,000,000

FOREIGN COUNTRIES

United States	£632,000,000
Argentina	329,000,000
Brazil	135,000,000
Mexico	81,000,000
Japan	74,000,000
Chile	57,000,000
Egypt	75,000,000
Uruguay	40,00,000
China	38,000,000
Peru	32,000,000
Cuba	29,000,000
European Countries	170,000,000
Other Foreign Countries	92,000,000
Total	£1,784,000,000
Grand Total British Possessions and Foreign Countries	£3,554,000,000

Germany's foreign investments, in all about 1,000,000,000*l.*, he considers less favorably placed, as for instance 170,000,000*l.* in Russia, and quite unproductive, 40,000,000*l.* in Turkey, and 50,000,000*l.* in Roumania.

"The remainder of Germany's foreign investments are over-seas. In the United States she has about 150,000,000*l.* invested, and in South America about 120,000,000*l.* The only center in which Germany can realize any of her foreign investments is New York; and, for the reasons already stated, it appears highly doubtful whether New York will be in a position to purchase back from Germany any substantial portion of her holdings of American Railway Stocks. Even if Germany succeeded in disposing of some of her American holdings, there would remain the difficulty of taking the securities across the Atlantic and bringing the proceeds—presumably foodstuffs or gold coin—back to Germany. This might conceivably be done in American ships, say from New York to Rotterdam; but this possibility has doubtless been fully considered by our naval authorities. There is another way in which Germany might seek to raise money in America, and that is by pledging her State railways. The railways of Germany are State property and they have an aggregate capital value of about 1,000,000,000*l.*; any negotiations for the raising of a loan on this security should be carefully watched."

In conclusion, he says:

"We stand to lose and lose very heavily in the course of this vast war, but there is no occasion for despair. On the eve of the outbreak of war I estimated our national wealth at 16,000,000,000*l.* and our national income at 2,000,000,000. Taking the most unfavorable view possible, namely, that at the end of the war we find we have lost in direct and indirect expenditure, say, half a year's income and, say, one-sixteenth part of our capital, we shall still be a very rich nation. Relatively we shall be far richer than we were at the beginning of the war; and we may rest under the absolute certainty that, provided we keep the sea, we shall at the conclusion of the war be in a better position than any other power—not excepting the United States—to take full advantage of the vast expansion of trade which the experience of all previous wars justifies us in believing will then take place throughout the world."

NAVAL DEVELOPMENTS

Naval developments in the following strategic areas will be considered separately and in turn:

1. NORTH AND BALTIC SEAS.
2. MEDITERRANEAN AND BLACK SEAS.
3. THE FAR EAST.
4. THE PACIFIC.
5. THE ATLANTIC.

BELLIGERENTS' WAR LOSSES

Table Revised to November 8, 1914

LOSSES OF BRITAIN AND HER ALLIES

Cruisers:	Tons
Good Hope (British), by gun-fire, 1.11.14	14,100
Aboukir (British), torpedoed, 22.9.14	12,000
Cressy (British), torpedoed, 22.9.14	12,000
Hogue (British), torpedoed, 22.9.14	12,000
Monmouth (British), gun-fire, 1.11.14	9,800
Pallada (Russian), torpedoed, 11.10.14	7,775
Hawke (British), torpedoed, 15.10.14	7,350
Hermes (British), torpedoed, 31.10.14	5,600
Takachiho (Japanese), mined, 17.10.14	3,700

	Tons
Cruisers:	
Amphion (British), mined, 6.8.14	3,440
Jemtchug (Russian), torpedoed, 28.10.14	3,050
Pathfinder (British), torpedoed, 5.9.14	2,940
Pegasus (British), gun-fire, 20.9.14	2,135
Gunboats:	
Donetz (Russian), gun-fire, 29.10.14	1,200
Speedy (British), mined, 3.9.14	810
Zelée (French), gun-fire, 22.9.14	680
Destroyers:	
Shirataye (Japanese), wrecked, 4.9.14	380
Mousquet (French), gun-fire, 28.10.14	303
Submarines:	
AE 1 (British), foundered, 14.9.14	725
E 3 (British), destroyed by enemy, 18.10.14	725
D 6 (British), mined, 3.11.14	550
Torpedo-boats:	
347 (French), collision, 9.10.14	98
338 (French), collision, 9.10.14	97
Armed merchantmen and auxiliaries:	
Oceanic (British), wrecked, 8.9.14	7,333
Prut (Russian), sunk by enemy, 29.10.14	5,500
Rohilla (British), mined, 30.10.14	4,240
Total, 26 units, of 118,531 tons.	

In the cases of the *E 3* and the Russian minelayer *Prut* published information is insufficient to determine the exact method by which the loss was brought about. It will be observed that the torpedo has so far been easily first in the destruction it has caused so far as this country is concerned.

LOSSES OF GERMANY AND HER ALLIES

Cruisers:	
Yorck (German), mined, 3.11.14	9,050
Magdeburg (German), gun-fire, 27.8.14	4,550
Köln (German), gun-fire, 28.8.14	4,350
Mainz (German), gun-fire, 28.8.14	4,350
Kaiserin Elisabeth (Austrian), at Tsing-tao, 6.11.14	4,000
Ariadne (German), gun-fire, 28.8.14	2,660
Zenta (Austrian), gun-fire, 16.8.14	2,300
Hela (German), torpedoed, 13.9.14	2,040
Gunboats:	
Iltis (German), at Tsing-tao, 6.11.14	900
Juguar (German), at Tsing-tao, 6.11.14	900
Luchs (German), at Tsing-tao, 6.11.14	900
Möwe (German), gun-fire, 9.8.14	650
Burak Reis (Turkish), scuttled to avoid capture, 31.10.14	500
Temes (Austrian), mined, 23.10.14	440
Hedwig von Wissmann (German), captured, 20.8.14	199
Tsing-tao (German), interned, 17.8.14	168
Destroyers:	
Vaterland (German), interned, —.8.14	168
V 187 (German), by gun-fire, 28.8.14	650
S 126 (German), torpedoed, 6.10.14	487
S 119 (German), gun-fire, 17.10.14	420
S 118 (German), gun-fire, 17.10.14	420
S 117 (German), gun-fire, 17.10.14	420
S 115 (German), gun-fire, 17.10.14	420
S 90 (German), driven ashore, 20.10.14	400
Taku (German), at Tsing-tao, 6.11.14	280

	Tons
Submarines:	
U 15 (German), run down, 9.8.14	250
U ? (German), run down, 24.10.14	250
Torpedo-boat:	
19 (Austrian), mined, 17.8.14	78
Armed merchantmen and auxiliaries:	
Cap Trafalgar (German), gun-fire, 14.9.14	9,854
Kaiser Wilhelm der Grösse (German), gun-fire, 27.8.14	5,521
Bethania (German), captured, —.9.14	4,848
Markomannia (German), captured, —.10.14	2,840
Spreewald (German), captured, 12.9.14	2,414
Graecia (German), captured, —.10.14	1,697
Konigin Luise (German), gun-fire, 5.8.14	948
Ophelia (German), captured, 17.10.14	?
Itolo (German), gun-fire, —.9.14	165
Rhios (German), gun-fire, —.9.14	150
Soden (German), captured, —.9.14	150

Total, 39 units, of about 72,000 tons.

To the above list of losses of Germany and her Allies should be added the cruiser *Emden* (3,544 tons), reported burnt, and the cruiser *Königsberg* (3,350 tons), reported "bottled up."

To the losses of Great Britain should be added the dreadnought battleship *Audacious* and the pre-dreadnought battleship *Bulwark*.—*Naval and Military Record*, 11/11.

EIGHT GERMAN SHIPS STILL FREE

	Tonnage	Built	Men
ARMORED CRUISERS			
Scharnhorst	11,420	1908	650
Gneisenau	11,420	1908	650
BATTLE CRUISERS			
Goeben	22,600	1911	...
UNARMORED CRUISERS			
Dresden	3,544	1908	348
Karlsruhe	4,850	1913	373
Nuremberg	3,550	1908	295
Leipzig	3,200	1906	285
Breslau	4,500	1911	165

The *Breslau* and the *Goeben*, although nominally sold to Turkey, are regarded by the Allies as German to all intents.—*New York Sun*, 11/13.

NORTH AND BALTIC SEAS

BRITISH SHIPS IN HOME WATERS

12 super-dreadnought battleships.
(3 were due for completion this year and are probably now in commission.)
11 dreadnought battleships.
7 dreadnought battle cruisers.
37 pre-dreadnought battleships.
27 armored cruisers.
22 light cruisers.
41 protected cruisers.
198 destroyers.
89 torpedo-boats.
70 submarines.
7 mine layers.
3 repair ships.

GERMAN SHIPS IN HOME WATERS

16 dreadnoughts.	30 light cruisers.
4 battle cruisers.	151 destroyers.
24 pre-dreadnoughts.	43 torpedo-boats.
9 armored cruisers.	38 submarines.

RUSSIAN SHIPS IN BALTIC WATERS

4 pre-dreadnought battleships.	80 destroyers.
13 armored and protected cruisers.	24 submarines.
2 light cruisers.	

THE BATTLE OFF HELIGOLAND

OFFICIAL DESPATCHES FROM BRITISH ADMIRALS

H. M. S. Lion

September 1, 1914.

Sir.—I have the honor to report that on Thursday, August 27, at 5 a. m., I proceeded with the First Battle Cruiser Squadron and First Light Cruiser Squadron in company, to rendezvous with the Rear Admiral, *Invincible*.

At 4 a. m., August 28, the movements of the flotillas commenced, as previously arranged, the Battle Cruiser Squadron and Light Cruiser Squadron supporting. The Rear Admiral, *Invincible*, with *New Zealand* and four destroyers, having joined my flag, the squadron passed through the prearranged rendezvous.

At 8.10 a. m. I received a signal from the Commodore (T), informing me that the flotilla was in action with the enemy. This was presumably in the vicinity of their prearranged rendezvous. From this time until 11 a. m. I remained about the vicinity ready to support as necessary, intercepting various signals, which contained no information on which I could act.

At 11 a. m. the squadron was attacked by three submarines. The attack was frustrated by rapid maneuvering, and the four destroyers were ordered to attack them. Shortly after 11 a. m. various signals having been received indicating that the Commodore (T), and Commodore (S) were both in need of assistance, I ordered the Light Cruiser Squadron to support the torpedo flotillas.

Later I received a signal from the Commodore (T), stating that he was being attacked by a large cruiser, and a further signal informing me that he was being hard pressed, and asking for assistance. The Captain (D), First Flotilla, also signalled that he was in need of help.

From the foregoing the situation appeared to me critical. The flotillas had advanced only 10 miles since 8 a. m., and were only about 25 miles from two enemy bases on their flank and rear respectively. Commodore Goodenough had detached two of his light cruisers to assist some destroyers earlier in the day, and these had not yet rejoined. (They rejoined at 2.30 p. m.) As the reports indicated the presence of many enemy ships—one a large cruiser—I considered that his force might not be strong enough to deal with the situation sufficiently rapidly, so at 11.30 a. m. the battle cruisers turned to ESE. and worked up to full speed. It was evident that to be of any value the support must be overwhelming, and carried out at the highest speed possible.

I had not lost sight of the risk of submarines, and possible sortie in force from the enemy's base, especially in view of the mist to the southeast.

Our high speed, however, made submarine attack difficult, and the smoothness of the sea made their detection comparatively easy. I considered that we were powerful enough to deal with any sorties except by a battle squadron, which was unlikely to come out in time, provided our stroke was sufficiently rapid.

At 12.15 p. m. *Fearless* and First Flotilla were sighted retiring west. At the same time the Light Cruiser Squadron was observed to be engaging an enemy ship head. They appeared to have her beat.

I then steered NE. to sounds of firing ahead, and at 12.30 p. m. sighted *Arethusa* and Third Fotilla retiring to the westward engaging a cruiser of the *Kolberg* class on our port bow. I steered to cut her off from Heligoland, and at 12.37 p. m. opened fire. At 12.42 the enemy turned to NE., and we chased at 27 knots.

At 12.56 p. m. sighted and engaged a two-funnelled cruiser ahead. *Lion* fired two salvos at her, which took effect, and she disappeared into the mist, burning furiously and in a sinking condition. In view of the mist and that she was steering at high speed at right angles to *Lion*, who was herself steaming at 28 knots, the *Lion's* firing was very creditable.

Our destroyers had reported the presence of floating mines to the eastward, and I considered it inadvisable to pursue her. It was also essential that the squadrons should remain concentrated, and I accordingly ordered a withdrawal. The battle cruisers turned north and circled to port to complete the destruction of the vessel first engaged. She was sighted again at 1.25 p. m. steaming SE., with colors still flying. *Lion* opened fire with two turrets, and at 1.35 p. m., after receiving two salvos, she sank.

The four attached destroyers were sent to pick up survivors, but I deeply regret that they subsequently reported that they searched the area but found none.

At 1.40 p. m. the battle cruisers turned to the northward, and *Queen Mary* was again attacked by a submarine. The attack was avoided by the use of the helm. *Lowestoft* was also unsuccessfully attacked. The battle cruisers covered the retirement until nightfall. By 6 p. m., the retirement having been well executed and all destroyers accounted for, I altered course, spread the light cruisers, and swept northwards in accordance with the Commander-in-Chief's orders. At 7.45 p. m. I detached *Liverpool* to Rosyth with German prisoners, seven officers and 79 men, survivors from *Mainz*. No further incident occurred. I have the honor to be, sir, your obedient servant,

(Signed) DAVID BEATTY, *Vice Admiral.*

The Secretary of the Admiralty.

Euryalus

September 28, 1014.

Sir.—I have the honor to report that in accordance with your orders a reconnaissance in force was carried out in the Heligoland Bight on August 28, with the object of attacking the enemy's light cruisers and destroyers.

The forces under my orders (viz., the cruiser force, under Rear Admiral H. H. Campbell, C. V. O., *Euryalus, Amethyst,* First and Third Destroyer Flotillas, and the submarines) took up the positions assigned to them on the evening of August 27, and, in accordance with directions given, proceeded during the night to approach the Heligoland Bight.

The cruiser force under Rear Admiral Campbell, with *Euryalus* (my flagship) and *Amethyst,* was stationed to intercept any enemy vessels chased to the westward. At 4.30 p. m. on August 28 these cruisers, having proceeded to the eastward, fell in with *Lurcher* and three other destroyers, and the wounded and prisoners in these vessels were transferred in boats to *Bacchante* and *Cressy,* which left for the Nore. *Amethyst* took *Laurel* in tow at 9.30 p. m. *Hogue* was detached to take *Arethusa* in tow. This latter is referred to in Commodore R. Y. Tyrwhitt's report, and I quite concur in his remarks as to the skill and rapidity with which this was done in the dark with no lights permissible.

Commodore Reginald Y. Tyrwhitt was in command of the destroyer flotillas, and his report is enclosed herewith. His attack was delivered with great skill and gallantry, and he was most ably seconded by Captain William F. Blunt, in *Fearless,* and the officers in command of the destroyers, who handled their vessels in a manner worthy of the best traditions of the British Navy.

Commodore Roger J. B. Keyes, in *Lurcher,* had, on August 27, escorted some submarines into positions allotted to them in the immediate vicinity of the enemy's coast. On the morning of August 28, in company with *Firedrake,* he searched the area to the southward of the battle cruisers for the enemy's submarines, and subsequently, having been detached, was present at the sinking of the German cruiser *Mainz,* when he gallantly proceeded alongside her and rescued 220 of her crew, many of whom were wounded. Subsequently he escorted *Laurel* and *Liberty* out of action, and kept them company till Rear Admiral Campbell's cruisers were sighted.

I have the honor to be, sir, your obedient servant,

A. H. CHRISTIAN, *Rear Admiral.*

The Secretary, Admiralty.

H. M. S. Lowestoft

September 26, 1914.

Sir.—I have the honor to report that at 5 a. m. on Thursday, August 27, in accordance with orders received from their lordships, I sailed in *Arethusa,* in company with the First and Third Flotillas, except *Hornet, Tigress, Hydra,* and *Loyal,* to carry out the prearranged operations. H. M. S. *Fearless* joined the flotillas at sea that afternoon.

At 6.53 a. m. on Friday, August 28, an enemy's destroyer was sighted and was chased by the Fourth Division of the Third Flotilla.

From 7.20 to 7.57 a. m. *Arethusa* and the Third Flotilla were engaged with numerous destroyers and torpedo-boats which were making for Heligoland; course was altered to port to cut them off.

Two cruisers, with four and two funnels respectively, were sighted on the port bow at 7.57 a. m., the nearest of which was engaged. *Arethusa* received a heavy fire from both cruisers and several destroyers until 8.15 a. m., when the four-funnelled cruiser transferred her fire to *Fearless.*

Close action was continued with the two-funnelled cruiser on converging courses until 8.25 a. m., when a 6-inch projectile from *Arethusa* wrecked the fore bridge of the enemy, who at once turned away in the direction of Heligoland, which was sighted slightly on the starboard bow at about the same time.

All ships were at once ordered to turn to the westward, and shortly afterwards speed was reduced to 20 knots.

During this action *Arethusa* had been hit many times, and was considerably damaged; only one 6-inch gun remained in action, all other guns and torpedo-tubes having been temporarily disabled.

Lieutenant Eric W. P. Westmacott (signal officer) was killed at my side during this action. I cannot refrain from adding that he carried out his duties calmly and collectedly, and was of the greatest assistance to me.

A fire occurred opposite No. 2 gun port side, caused by a shell exploding some ammunition, resulting in a terrific blaze for a short period and leaving the deck burning. This was very promptly dealt with and extinguished by Chief Petty Officer Frederick W. Wrench.

The flotillas were reformed in divisions and proceeded at 20 knots. It was now noticed that the *Arethusa's* speed had been reduced.

Fearless reported that the Third and Fifth Divisions of the First Flotilla had sunk the German Commodore's destroyer, and that two boats' crews belonging to *Defender* had been left behind, as our destroyers had been fired upon by a German cruiser during their act of mercy in saving the survivors of the German destroyer.

At 10 a. m., hearing that Commodore (S) in *Lurcher* and *Firedrake* were being chased by light cruisers, I proceeded to his assistance with *Fearless* and the First Flotilla until 10.37 a. m., when, having received no news, and being in the vicinity of Heligoland, I ordered the ships in company to turn to the westward.

All guns except two 4-inch were again in working order, and the upper deck supply of ammunition was replenished.

At 10.55 a. m. a four-funnelled German cruiser was sighted, and opened a very heavy fire at about 11 o'clock.

Our position being somewhat critical, I ordered *Fearless* to attack, and the First Flotilla to attack with torpedoes, which they proceeded to do with great spirit. The cruiser at once turned away, disappeared in the haze, and evaded the attack.

About ten minutes later the same cruiser appeared on our starboard quarter. Opened fire on her with both 6-inch guns; *Fearless* also engaged her, and one division of destroyers attacked her with torpedoes without success.

The state of affairs and our position was then reported to the Admiral Commanding Battle Cruiser Squadron.

We received a very severe and almost accurate fire from this cruiser; salvo after salvo was falling between 10 and 30 yards short, but not a single shell struck; two torpedoes were also fired at us, being well directed, but fell short.

The cruiser was badly damaged by *Arethusa's* 6-inch guns, and a splendidly directed fire from *Fearless,* and she shortly afterwards turned away in the direction of Heligoland.

Proceeded, and four minutes later sighted the three-funnelled cruiser *Mainz.* She endured a heavy fire from *Arethusa* and *Fearless* and many destroyers. After an action of approximately 25 minutes, she was seen to be sinking by the head, her engines stopped, besides being on fire.

At this moment the Light Cruiser Squadron appeared, and they very speedily reduced the *Mainz* to a condition which must have been indescribable.

I then recalled *Fearless* and the destroyers, and ordered cease fire.

We then exchanged broadsides with a large four-funnelled cruiser on the starboard quarter at long range, without visible effect.

The Battle Cruiser Squadron now arrived and I pointed out this cruiser to the Admiral Commanding, and was shortly afterwards informed by him that the cruiser in question had been sunk and another set on fire.

The weather during the day was fine, sea calm, but visibility poor, not more than three miles at any time when the various actions were taking place, and was such that ranging and spotting were rendered difficult.

I then proceeded with 14 destroyers of the Third Flotilla and nine of the First Flotilla.

Arethusa's speed was about six knots until 7 p. m., when it was impossible to proceed any further, and fires were drawn in all boilers except two, and assistance called for.

At 9.30 p. m. Captain Wilmot S. Nicholson, of the *Hogue,* took my ship in tow in a most seamanlike manner, and, observing that the night was pitch dark, and the only lights showing were two small hand lanterns, I consider his action was one which deserves special notice from their lordships.

His Majesty's ship under my command was then towed to the Nore, arriving at 5 p. m. on August 29. Steam was then available for slow speed, and the ship was able to proceed to Chatham under her own steam.

I beg again to call attention to the services rendered by Captain W. F. Blunt, of His Majesty's ship *Fearless,* and the commanding officers of the destroyers of the First and Third Flotillas, whose gallant attacks on the German cruisers at critical moments undoubtedly saved *Arethusa* from more severe punishment and possible capture.

I cannot adequately express my satisfaction and pride at the spirit and ardor of my officers and ship's company, who carried out their orders with the greatest alacrity under the most trying conditions, especially in view of the fact that the ship, newly built, had not been 48 hours out of the dockyard before she was in action.

SUBMARINE REPORTS

H. M. S. Maidstone

October 17, 1914.

Sir.—In compliance with their lordship's directions, I have the honor to report as follows upon the services performed by submarines since the commencement of hostilities.

Three hours after the outbreak of war, submarines *E 6* (Lieutenant Commander Cecil P. Talbot) and *E 8* (Lieutenant Commander Francis H. H. Goodhart), proceeded unaccompanied to carry out a reconnaissance in the Heligoland Bight. These two vessels returned with useful information, and had the privilege of being the pioneers on a service which is attended by some risk.

During the transportation of the expeditionary force the *Lurcher* and *Firedrake* and all the submarines of the Eighth Submarine Flotilla occupied positions from which they could have attacked the High Sea Fleet, had it emerged to dispute the passage of our transports. This patrol was maintained day and night without relief, until the personnel of our army had been transported, and all chance of effective interference had disappeared.

These submarines have since been incessantly employed on the enemy's coast in Heligoland Bight and elsewhere, and have obtained much valuable information regarding the composition and movement of his patrols. They have occupied his waters and reconnoitered his anchorages, and, while so engaged, have been subjected to skilful and well-executed anti-submarine tactics; hunted for hours at a time by torpedo craft, and attacked by gunfire and torpedoes.

SCOUTING FOR SUBMARINES

At midnight on August 26 I embarked in the *Lurcher*, and, in company with *Firedrake* and submarines *D 2*, *D 8*, *E 4*, *E 5*, *E 6*, *E 7*, *E 8*, and *E 9*, of the Eighth Submarine Flotilla, proceeded to take part in the operations in the Heligoland Bight arranged for August 28. The destroyers scouted for the submarines until nightfall on the 27th, when the latter proceeded independently to take up various positions from which they could co-operate with the destroyer flotillas on the following morning.

At daylight on August 28 the *Lurcher* and *Firedrake* searched the area, through which the battle cruisers were to advance, for hostile submarines, and then proceeded towards Heligoland in the wake of submarines *E 6*, *E 7*, and *E 8*, which were exposing themselves with the object of inducing the enemy to chase them to the westward.

On approaching Heligoland the visibility, which had been very good to seaward, reduced to 5000 to 6000 yards, and this added considerably to the anxieties and responsibilities of the commanding officers of submarines, who handled their vessels with coolness and judgment in an area which was necessarily occupied by friends as well as foes.

Low visibility and calm sea are the most unfavorable conditions under which submarines can operate, and no opportunity occurred of closing with the enemy's cruisers to within torpedo range.

SINKING OF GERMAN DESTROYER "V 187"

Lieutenant Commander Ernest W. Leir, commanding submarine *E 4*, witnessed the sinking of the German torpedo-boat destroyer *V 187* through his periscope, and, observing a cruiser of the *Stettin* class close, and open fire on the British destroyers which had lowered their boats to pick up the survivors, he proceeded to attack the cruiser, but she altered her course before he could get within range. After covering the retirement of our destroyers, which had had to abandon their boats, he returned to the latter, and embarked a lieutenant and nine men of *Defender*, who had been left behind. The boats also contained two officers and eight men of *V 187*,

who were unwounded, and 18 men who were badly wounded. As he could not embark the latter, Lieutenant Commander Leir left one of the officers and six unwounded men to navigate the British boats to Heligoland. Before leaving he saw that they were provided with water, biscuit, and a compass. One German officer and two men were made prisoners of war.

Lieutenant Commander Leir's action in remaining on the surface in the vicinity of the enemy, and in a visibility which would have placed his vessel within easy gun range of an enemy appearing out of the mist, was altogether admirable.

"HELA" SUNK

On September 13, *E 9* (Lieutenant Commander Max K. Horton) torpedoed and sank the German light cruiser *Hela* six miles south of Heligoland.

A number of destroyers were evidently called to the scene after *E 9* had delivered her attack, and these hunted her for several hours.

On September 14, in accordance with his orders, Lieutenant Commander Horton examined the outer anchorage of Heligoland, a service attended by considerable risk.

On September 25, submarine *E 6* (Lieutenant Commander C. P. Talbot), while diving, fouled the moorings of a mine laid by the enemy. On rising to the surface she weighed the mine and sinker; the former was securely fixed between the hydroplane and its guard; fortunately, however, the horns of the mine were pointed outboard. The weight of the sinker made it a difficult and dangerous matter to lift the mine clear without exploding it. After half an hour's patient work this was effected by Lieutenant Williams-Freeman and Able Seaman Ernest Randall Cremer, and the released mine descended to its original depth.

"S 126" SUNK

On October 6, *E 9* (Lieutenant Commander Max K. Horton), when patrolling off the Ems, torpedoed and sank the enemy's destroyer *S 126*.

The enemy's torpedo craft pursue tactics which, in connection with their shallow draft, make them exceedingly difficult to attack with torpedo, and Lieutenant Commander Horton's success was the result of much patient and skilful zeal. He is a most enterprising submarine officer, and I beg to submit his name for favorable consideration.

Against an enemy whose capital vessels have never, and light cruisers have seldom, emerged from their fortified harbors, opportunities of delivering submarine attacks have necessarily been few, and on one occasion only, prior to September 13, has one of our submarines been within torpedo range of a cruiser during daylight hours.

During the exceptionally heavy westerly gales which prevailed between September 14 and 21, the position of the submarine on a lee shore, within a few miles of the enemy's coast, was an unpleasant one.

The short, steep seas which accompany westerly gales in the Heligoland Bight made it difficult to keep the conning-tower hatches open. There was no rest to be obtained, and even when cruising at a depth of 60 feet the submarines were rolling considerably and pumping, *i. e.*, vertically moving about 20 feet.

I submit that it was creditable to the commanding officers that they should have maintained their stations under such conditions.

I have the honor to be, sir, your obedient servant,

(Signed) ROGER KEYES, *Commodore (S)*.

—*United Service Gazette*, 10/29.

NAVAL EXPERT SAYS TRAP WAS LAID FOR BRITISH AT HELIGOLAND

LONDON, November 4.

Complete details of the naval battle off Heligoland on August 28 have just been given out by the Admiralty, and several of the naval critics whose

opinions count for much over here find distinct evidences in the reports of the British commanders that a disastrous defeat at the hands of the Germans was only averted by the desperate risks taken by Rear Admiral David Beatty, commanding the battle cruiser squadron.

Possibly the best known writer on naval affairs in England, Fred T. Jane, publishes in *Land and Water* an astonishing commentary on the Heligoland fight. His summary is tersely put:

"We tried a very smart thing. We were trapped and failed. Admiral Beatty came to the rescue and transformed defeat into victory by taking atrocious risks. And he saved us by the skin of the teeth."

Piecing together the official reports, Mr. Jane finds that the Germans set a trap for the British destroyers and the light cruiser *Arethusa* by sending out a destroyer as a lure. Chasing the German destroyer, the British light ships found a second line of German ships—armored cruisers—waiting for them. Aud meanwhile German submarines had slipped between the British flotilla and their avenue of retreat toward the heavy British ships. At 11 a. m. that day the British flotilla was in danger of destruction by the big German cruisers, but the Germans did not press their advantage as rapidly as they might have done and this gave Admiral Beatty time to dash to the rescue with the battle cruiser *Lion* and her sister ships.

"At 11.30 a. m. Admiral Beatty brought in his battle cruisers at 28 knots. He ran great risks from submarines, but he annihilated all that was left of the first German line and saved the day. I am inclined to credit this first German line with having taken annihilation in order to cover the retreat of the second and possibly the third and perhaps even the fourth (battle fleet) behind. In acting as he did Admiral Beatty turned what should have been a British defeat into a British victory, or rather a semi-victory, for it now seems abundantly clear that the Germans were ready for us off Heligoland on August 28.

"The situation as I read it is that the Germans had prepared an overwhelming reception for the *Arethusa* and her consorts, that they had won and that everything was with them when suddenly Admiral Beatty charged out of the mist with his battle cruisers. We sank four units of the enemy's light stuff, but we got no heavy stuff. To describe the Heligoland affair as a German victory—their loss four units, our loss none—sounds very ridiculous. But psychologically I am afraid that it is nearer the truth. The rats in that matter evaded the trap."

Mr. Jane utters a very plain hint to the public that the bombastic assertions of some newspapers must not be taken seriously.

"Our popular press," he writes, "feeds us on apparent results. Such results are admirable for the music hall stage. But from the naval war standard the fact remains that if Admiral Beatty had not taken abnormal risks we should have been badly beaten in the Bight of Heligoland on August 28.

"The task before us is no light one. Not only are we faced against men able to fight quite as well as we can but we are also faced by an admiral who has his side of the business very much in hand. The British Navy is up against the biggest proposition that is has ever had to face. I hope and I think that it will win through. But the fight is going to be a very hard one; and the bombast of the daily press about the 'skulking fleet,' etc., is very ill-timed."—*New York Sun*, 11/17.

GERMAN AIRSHIP AIDED IN SINKING CRUISERS

LONDON, October 6.

The *Standard's* Berlin correspondent sends by an indirect route this dispatch bearing date of October 1:

"The Kaiser has conferred the Iron Cross on the commander and each member of the crew of the German naval airship *Schuckelanz II.* This distinction is conferred for services rendered to the Fatherland by 'the

magnificent aerial reconnoitering that led to the destruction of the three British cruisers' recently torpedoed in the North Sea by German submarines."—*New York Times*, 10/7.

AN EXCELLENT GUNNERY FEAT.—Admiral Beatty, in his direction and personal conduct of the operations off Heligoland, showed that he fully realized that war cannot be made without risks being taken, and although he knew that there were German submarines in the vicinity of the battle, he did not hesitate to take his battle cruiser squadron to the aid of his hard-pressed cruisers and destroyers, when he was asked for aid by his subordinate leaders. This aid was timely and decisive, and incidentally brought a very gratifying fact to light. We have paid much attention to naval gunnery during the last decade, and have secured what we all believed to be an excellent standard of gunnery efficiency in the fleet during peace time. There were those, however, who asked if this standard would be maintained on the day of battle? They now have their reply in Admiral Beatty's despatch, in which he says: "At 12.56 p. m. we sighted and engaged a two-funnelled cruiser ahead. *Lion* fired two salvos at her, and she disappeared into the mist burning furiously and in a sinking condition. In view of the mist and that she was steering at high speed, at right angles to *Lion*, who was herself steering at 28 knots, the *Lion's* firing was very creditable." We should say so too, and add that stiff as our conditions of battle practice in peace time have been, no such test of efficiency has ever been imposed on our gunnery experts. A cruiser sunk with two salvos (not broadsides be it noted) steaming past a fast moving target at 28 knots, is a gunnery performance par excellence.—*United Service Gazette*, 10/29.

GERMAN SUBMARINE "U 9" SINKS "ABOUKIR," "CRESSY" AND "HOGUE."—From Berlin it is reported by the German Admiralty that the *U 9* made the attack on the three British ships, and that she escaped unhurt. She was commanded by Lieutenant Commander Weddigen, and Berlin reports that he and all the men under him have received the Order of the Iron Cross.

When the attack occurred the cruisers were steaming in a line ahead, three miles apart. The presence of the submarines was unsuspected.

The *Lowestoft*, the Dutch steamer *Flora*, torpedo-boat destroyers and fishing boats aided in the work of rescue.

Revised figures of the casualties show that 1067 officers and men were saved out of a total of 2200 who were on board the cruisers sunk. The probable loss is 1133.

The three British cruisers, *Aboukir*, *Hogue* and *Cressy*, belonged to the *Cressy* class of six ships, having a water-line length of 454 feet, beam 69½ feet and a designed speed of 21 knots. They had an armor belt 11½ feet wide, 230 feet long and five feet below water-line. They carried two 9.2-inch 40 caliber guns; 12 6-inch 45 caliber, 12 12-pounder, 12 cwt.; one 12-pounder, 8 cwt.; three 3-pounder; torpedo-tubes (18-inch), two submerged. The guns were mounted in barbettes and turrets with six inches of armor, and casemates with five inches. The conning-tower has 12 inches of armor. The *Cressy* dates from 1899, and the *Aboukir* and *Hogue* from 1900. The complement of the vessels was 700 men; flagship, 745.

The German submarine *U 9* had a crew of 20 men. She was built in 1910 at Dansic. She is of 300 tons, and her armament consists of three 18-inch torpedo-tubes and two 1-pounder guns. Her speed submerged is eight knots and on the surface 13 knots.

As to the radius of action of the submarine, Lieutenant Commander Weddigen of the *U 9* has been quoted as saying that just prior to his attack on the English cruisers he had returned from an adventurous voyage to the Shetland Islands. This would involve a journey of 1200 miles there and back.—*Army and Navy Journal*.

GOVERNMENT PRESS BUREAU

LONDON, Friday.

The Secretary of the Admiralty authorizes the following statement with reference to the sinking of the three cruisers, *Aboukir, Cressy,* and *Hogue:*

The facts of this affair cannot be better conveyed to the public than by the attached reports of the senior officers who have survived and landed in England. The sinking of the *Aboukir* was, of course, an ordinary hazard of patrolling duty. The *Hogue* and *Cressy,* however, were sunk because they proceeded to the assistance of their consort, and remained with engines stopped endeavoring to save life, thus presenting an easy and certain target to further submarine attacks.

The natural promptings of humanity have in this case led to heavy losses which would have been avoided by a strict adherence to military considerations. Modern naval war is presenting us with so many new and strange situations that an error of judgment of this character is pardonable. But it has been necessary to point out for the future guidance of his Majesty's ships that the conditions which prevail when one vessel of a squadron is injured in a minefield, or is exposed to submarine attack, are analogous to those which occur in an action, and that the rule of leaving disabled ships to their own resources is applicable, so far at any rate as large vessels are concerned. No act of humanity, whether to friend or foe, should lead to a neglect of the proper precautions and dispositions of war, and no measures can be taken to save life which prejudice the military situation. Small craft of all kinds should, however, be directed by wireless to close the damaged ship with all speed.

The loss of nearly 60 officers and 1400 men would not have been grudged if it had been brought about by gunfire in an open action, but it is peculiarly distressing under the conditions which prevailed. The absence of any of the ardor and excitement of an engagement did not, however, prevent the display of discipline, cheerful courage, and ready self-sacrifice among all ranks and ratings exposed to the ordeal.

The duty on which these vessels were engaged was an essential part of the arrangements by which the control of the seas and the safety of the country are maintained, and the lives lost are as usefully, as necessarily, and as gloriously devoted to the requirements of his Majesty's service as if the loss had been incurred in a general action. In view of the certainty of a proportion of misfortunes of this character occurring from time to time, it is important that this point of view should be thoroughly appreciated.

The loss of these three cruisers, apart from the loss of life, is of small naval significance. Although they were large and powerful ships, they belonged to a class of cruisers whose speeds have been surpassed by many of the enemy's battleships. Before the war it had been decided that no more money should be spent in repairing any of this class, and that they should make their way to the sale list as soon as serious defects became manifest.

REPORT BY COMMANDER BERTRAM W. L. NICHOLSON, R. N., LATE OF H. M. S. "CRESSY"

September 23, 1914.

Sir,—I have the honor to submit the following report in connection with the sinking of H. M. S. *Cressy,* in company with H. M. S. *Aboukir* and *Hogue,* on the morning of the 22d of September:

Whilst on patrol duty *Aboukir* was struck at about 6.25 a. m. on starboard beam. *Hogue* and *Cressy* closed, and took up position—*Hogue* ahead of *Aboukir* and *Cressy* about 400 yards on port beam. As soon as it was seen that *Aboukir* was in danger of sinking, all boats were sent away from *Cressy* and picket boat was hoisted out without steam up. When cutters full of *Aboukir's* men were returning to *Cressy, Hogue* was struck apparently under aft 9.2 magazine, as a very heavy explosion took place immediately after the first explosion.

Almost directly after *Hogue* was hit we observed a periscope on our port bow about 300 yards off. Fire was immediately opened, and engines put full speed ahead with intention of running her down. Our gunner, Mr. Dogherty, positively asserts that he hit the periscope, and that the submarine then showed her conning-tower, which he struck, and the submarine sank. An officer standing alongside the gunner thinks that the shell struck only floating timber, of which there was much about, but it was evidently the impression of the men on deck, who cheered and clapped heartily, that the submarine had been hit. This submarine did not fire a torpedo at *Cressy*.

Captain Johnson then maneuvered the ship so as to render assistance to crews of the *Hogue* and *Aboukir*. About five minutes later another periscope was seen on our starboard quarter. Fire was opened. The track of the torpedo she fired at a range of 500 to 600 yards was plainly visible, and it struck us starboard side just before the after bridge. The ship listed about 10 degrees to starboard and remained steady. Time, 7.15 a. m. All watertight doors, dead lights, and scuttles had been securely closed before the torpedo struck ship. All mess tools, and tables, shores, and all available timber below and on deck had been previously got up and thrown over the side for saving of life.

A second torpedo fired by the same submarine missed and passed about 20 feet astern. About a quarter of an hour after the first torpedo had hit, a third torpedo, fired from a submarine just before starboard beam, hit us in No. 5 boiler-room. Time, 7.30 a. m. The ship then began to heel rapidly, and finally turned keel up, remaining so for about 20 minutes before she finally sank at 7.55 a. m. A large number of men were saved by the casting adrift of a pattern three target. The steam pinnace floated out of her crutches, but filled and sank.

The second torpedo which struck *Cressy* passed over sinking hull of *Aboukir*, narrowly missing it. It is possible that the same submarine fired all three torpedoes at *Cressy*.

The conduct of the crew was excellent throughout. I have already reported the splendid service rendered by Captain Phillips, master of the trawler *L. T. Coriander*, and his crew, who picked up 156 officers and men. I have the honor, etc.,

BERTRAM W. L. NICHOLSON,
Commander, late H. M. S. Cressy.

REPORT BY COMMANDER REGINALD A. NORTON, R. N., LATE OF H. M. S. "HOGUE"

September 23, 1914.

Sir.—I have the honor to report as follows concerning the sinking of H. M. ships *Hogue*, *Aboukir* and *Cressy*:

Between 6.15 and 6.30 a. m. H. M. S. *Aboukir* was struck by a torpedo. The *Hogue* closed the *Aboukir*, and I received orders to hoist out the launch, turn out and prepare all boats, and unlash all timber on the upper deck. The two lifeboats were sent to the *Aboukir*, but before the launch could get away the *Hogue* was struck on the starboard side amidships by two torpedoes at intervals of 10 to 20 seconds. The ship at once began to heel to starboard.

After ordering the men to provide themselves with wood, hammocks, etc., and to get into the boats on the booms and take off their clothes, I went by Captain Nicholson's directions to ascertain the damage in the engine-rooms. An artificer-engineer informed me that the water was over the engine-room gratings. While endeavoring to return to the bridge the water burst open the starboard entry-port doors, and the ship heeled rapidly.

I told the men in the port battery to jump overboard as the launch was close alongside, and soon afterwards the ship lurched heavily to starboard. I clung to a ringbolt for some time, but eventually dropped on to the deck and a huge wave washed me away. I climbed up the ship's side, and was again washed off. Eventually, after swimming about from various overladen

pieces of wreckage, I was picked up by a cutter from the *Hogue*, Coxswain L. S. Marks, which pulled about for some hours picking up men and discharging them to our picket-boat and steam pinnace and to the Dutch steamers *Flora* and *Titan*, and rescued in this way Commander Sells; Engineer Commander Stokes, with legs broken; Fleet Paymaster Eldred, and about 120 others. Finally, about 11 a. m., when we could find no more men in the water, we were picked up by H. M. S. *Lucifer*, which proceeded to the *Titan* and took off from her all our men except about 20 who were too ill to be moved.

A *Lowestoft* trawler and the two Dutch ships *Flora* and *Titan* were extraordinarily kind, clothing and feeding our men. My boat's crew, consisting mainly of R. N. R. men, pulled and behaved remarkably well. I particularly wish to mention Petty Officer 1st Class Halton, who by encouraging the men in the water near me undoubtedly saved many lives.

Lieutenant Commander Phillipps-Wolley, after hoisting out the launch, asked me if he should try and hoist out another boat, and endeavored to do so. The last I saw of him was on the after bridge doing well. Lieutenant Tillard was picked up by the launch, got up a cutter's crew and saved many lives, as did Midshipman Cazalet in the *Cressy's* gig. Lieutenant Chichester turned out the whaler very quickly.

A Dutch sailing trawler sailed close by, but went off without rendering any assistance, though we signalled to her from the *Hogue* to close after we were struck.

The *Aboukir* appeared to me to take about 35 minutes to sink, floating bottom up for about five minutes. The *Hogue* turned turtle very quickly in about five minutes, and floated bottom up for some minutes. A dense black smoke was seen in the starboard battery, whether from coal or torpedo cordite I could not say. The upper deck was not blown up, and only one other small explosion occurred as we heeled over.

The *Cressy* I watched heel over from the cutter. She heeled over to starboard very slowly, a dense black smoke issuing from her when she attained an angle of about 90 degrees. She took a long time from this angle until she floated bottom up, with the starboard screw slightly out of the water. I consider that it was 35 to 45 minutes from the time when she was struck until she was bottom up.

All the men in the *Hogue* behaved extraordinarily well, obeying orders even when in the water swimming for their lives, and I witnessed many cases of great self-sacrifice and gallantry. Farmstone, able seaman, R. F. R., H. M. S. *Hogue*, jumped overboard from the launch to make room for others, and would not avail himself of assistance until all men nearby were picked up. He was in the water about half an hour. There was no panic of any sort, the men taking off their clothes as ordered and falling in with hammock or wood.

Captain Nicholson, in our other cutter, as usual, was perfectly cool, and rescued a large number of men. I last saw him alongside the *Flora*.

Engineer Lieutenant Commander Stokes, I believe, was in the engine-room to the last, and Engineer Lieutenant Commander Fendick got steam on the boat hoist and worked it in five minutes.

I have the honor to submit that I may be appointed to another ship as soon as I can get a kit. I have the honor, etc.,

REGINALD A. NORTON,
Commander, late H. M. S. Hogue.
—Navy and Military Record, 9/30.

The Admiralty have helped to clear up many misconceptions by the statement issued through the Press Bureau at the end of last week, in which certain lessons are drawn from the misfortune which cannot fail to be of value in the prevention of further incidents of a similar kind.

The error of judgment which led to the *Hogue* and *Cressy* remaining with their engines stopped in order to save life, thereby presenting open targets to further submarine attacks, is considered to be "pardonable" in

view of the many new and strange situations with which modern naval war is presenting us, and with this view there will be general agreement. Presumably, it does not follow from the Admiralty announcement that the matter is entirely closed, and it will be interesting to see whether the time-honored naval custom of holding courts-martial on the surviving officers of ships lost is adhered to.

The public have asked other questions arising out of the loss, such as the reason for their being insufficient lifebelts for all on board, why the torpedo nets were not lowered, and how it came about that the cruisers were patrolling without a protecting screen of small craft. The two former inquiries can hardly be asked by those intimate with modern conditions of naval war, while the latter, in regard to which the Admiralty remain silent, has been explained by the bad weather of the previous day having driven the destroyers into harbor, but for which there would have been plenty of vessels not only to save life but probably to prevent the loss of the *Hogue* and *Cressy*. It may be taken for granted that small craft will be at hand on future occasions, and that in the event of the weather being too rough for the destroyers to keep the sea the larger vessels will be kept as much as possible out of the range of submarine attack.—*Army and Navy Gazette*, 10/3.

"HAWKE" TORPEDOED BY GERMAN SUBMARINE.—October 16 the British Admiralty issued the following official report of the destruction of another British cruiser by a German submarine:

"His Majesty's ship *Theseus* was attacked by a submarine in the northern waters of the North Sea yesterday afternoon, but was missed. His Majesty's ship *Hawke* was attacked about the same time and was sunk. The *Hawke* was of 7350 tons displacement. She was 360 feet long, of 60 feet beam and drew 23 feet of water. She was a sister ship of the *Edgar*, *Endymion*, *Grafton*, *Theseus* and *Gibraltar*, and was launched in 1891. Her armament consisted of two 9.2-inch guns, ten 6-inch guns, twelve 6-pounders, five 3-pounders, two machine guns and two torpedo-tubes. Her complement is given at 544 men.—*Army and Navy Journal*, 10/17.

On October 15 the *Hawke* at about 11 a. m. sighted a collier flying the Norwegian flag, and changed her course slightly, in order to investigate the character of the collier. The cruiser was moving through the water at a moderate speed, when suddenly there was a terrific explosion. The ship reeled under the shock. Part of her side had been torn away. She had been torpedoed. The blow coincided almost exactly with 11 of the clock.

The crew were at various drills and the captain was on the bridge. Instantly the signal "Still" was given, and every man on deck remained at his post. Meanwhile in the stokehold there was chaos. "Skids" of coal, huge pokers weighing half a ton, spare parts of engines, and heaps of tools were hurled into the darkness as the ship listed. From the bridge the captain gave the order for the boats to be got out. Officers and men took up their stations for the task, but no steam could be got to the boat hoist. Meanwhile the ship was listing over, and the captain ordered "Every man for himself." Discarding clothing men leapt into the sea and clung to any floating wreckage. Within 10 minutes of the blow the *Hawke* had sunk.

With the greatest difficulty one boat had been launched—a cutter about 28 feet long. She was lowered from the davits, and the angle at which the cruiser then lay was such that the cutter could not be lowered clear of the ship, but slid down the side. Even then the dropping gear would not work properly. The cutter remained attached to the cruiser by one of the falls, and as the cruiser, which still had some way on her, was borne forward the cutter was in danger of being swamped. Swiftly seizing an axe Petty Officer Terry cut through the tackle and the boat was saved. Freed from the deadly entanglement the boat's crew pulled about and endeavored to

save those who were seen swimming in the water. In all 46 men and three officers were thus brought to safety.

The *Hawke* was well provided with means of life saving. She carried rafts, constructed of deal boards lashed together and floated by oil drums and empty barrels. Many men clambered on to these rafts. The water was not rough, but the cold was extreme, and men were seen to fall from the rafts into the water.

When the *Hawke* was struck the collier made off.—*London Times*, 10/19.

WILL THERE BE INQUIRIES?—No doubt the Admiralty will in due course hold properly constituted inquiries into the sinking of these ships (*Aboukir, Cressy* and *Hogue*), as well as the losses of the *Amphion, Pathfinder*, and *Speedy*. So far, although the war has been in progress for about two months, but little has been made known as to the action of the navy in home and foreign waters, except the short statements issued from time to time by the Admiralty through the Press Bureau. We are being supplied with detailed stories from the battlefields in Europe, supplemented by singularly graphic statements of the progress of events prepared by a member of Sir John French's staff. About the navy, which is our first line of defence, and upon which our safety depends, we have had but little news. So far nothing has been stated as to when the courts of inquiry into losses at sea are to be held. There are a hundred and one questions which ought to be raised formally in the interests of the navy, and, moreover, for hisforical reasons, the real facts surrounding the losses we have suffered ought to be established. For instance, to this day there has been no authenticated statement as to how the *Pathfinder* came to be sunk; it was at first attributed by the Admiralty to a mine, but it has since been stated that a German submarine was responsible. Then, again, take the case of the *Speedy*. It has been admitted that she was destroyed by a mine. The Admiralty has asserted more than once that the officers in command at sea know where the Germans have laid mines, and skippers of trawlers have been blamed for invading waters which they were warned to avoid. If the naval authorities have such complete information as warrants them suggesting taking action against disobedient skippers, surely there should be some inquiry as to how the *Speedy* came to be lost. Again, nothing which has yet appeared furnishes any explanation of how it happened that the three cruisers *Aboukir, Cressy* and *Hogue* came to be within an area which events have proved to be perilous when unaccompanied by destroyers, which could at least have rendered the attack of the German submarines more difficult. These cruisers were very large ships to be sent unsupported into such an area. It can hardly be the intention of the Admiralty to abrogate the rule in accordance with which the loss of one of his Majesty's ships is followed by an inquiry. The observance of this old custom is in the interests of the navy. It was the navy itself which ordained that loss of a ship should be followed by an inquiry. In the present war it is all the more desirable that this rule should be observed, since the authorities have been able to observe so large a measure of secrecy as to the navy's movements. Inquiries ought certainly to take place, not only in the interests of the service, but as offering some satisfaction to those who have lost relatives. They will naturally desire to have the satisfaction of possessing a record of the circumstances in which so many lives were lost, and the assurance that the sacrifice which has been made was made in circumstances which could not be avoided.—*Naval and Military Record*, 9/30.

NAVAL ACTION OF OCTOBER 17 OFF DUTCH COAST.—The light cruiser *Undaunted*, with the destroyers *Lance, Legion* and *Lennox* following in her wake, steamed into Harwich Harbor on Sunday afternoon (October 18) amid tremendous cheering, in recognition of the flotilla's brilliant and successful engagement with four German destroyers off the Dutch coast on Saturday afternoon (October 17).

From details of the naval battle which have been obtained, it appears that the *Undaunted*, with the four destroyers *Lance*, *Lennox*, *Legion* and *Loyal*, came into contact with the enemy off the Dutch coast, and succeeded in cutting off his retreat. Finding themselves surrounded, the four German destroyers fought with courage and skill, but they could make no headway against the British attack. The action opened shortly before 3 o'clock, and by a little after 4 o'clock the last of the enemy's ships sank, her small guns firing to the end.

The *Undaunted* was launched in 1914. She is a vessel of 3750 tons displacement, 410 feet long, with a beam of 39 feet, and a draft of 13½ feet. With an indicated horse-power of 30,000, her contract speed was 29 knots, and it is understood she easily exceeded this on her official trials. No official particulars regarding the class have been published, but according to *Brassey's Annual* she carried two 6-inch and eight 4-inch guns, and is armed with two torpedo-tubes. Her armored belt is 2½ inches thick.

The *L* class of destroyers were provided for in the Navy Estimates of 1911-12, and they have all been built at private yards. They are 260 feet long, 27.8 feet beam, 9.5 feet draft, 965 tons displacement, and their engines have an indicated horse-power of 25,600, giving them a speed of 29 knots. This speed has been considerably exceeded by all the class, and 35 knots has often been got out of them.

The destroyers carry a complement of 100, and they have storage capacity for 135 tons of coal or oil.

THE LOST GERMAN DESTROYERS.—It is officially announced from Berlin (according to a Reuter's message from Amsterdam) that the German torpedo-boat destroyers sunk off the Dutch coast were *S 115*, *S 117*, *S 118* and *S 119*.

The destroyers were four of a class of six boats launched at Elbing in 1902-3. They were 200 feet long, had 23 feet beam, 8.9 feet draft, and 350 tons displacement. With an indicated horse-power of 6000 they achieved 29.2 knots on their trials. The craft have two screws and two torpedo-tubes, and they were armed with three 3-pounder guns. Their complement was 49, and fuel capacity 100 tons. The vessels were very similar to, but not so fast or so well armed as, the Seventh Flotilla destroyers attached to Devonport.

GRAPHIC ACCOUNT OF ACTION BY AN OFFICER SERVING ON H. M. S. "UNDAUNTED."—We steamed out of Harwich with all the ships' companies jubilant and eager to get into the danger zone, as it was reported that a "certain amount of liveliness" prevailed in the North Sea. All was quiet until 2 o'clock, when, heading up northwards and skirting the Dutch coastline, we sighted the smoke of four vessels. Our captain immediately cleared for action, and signalled the order to chase. We steamed at top speed, with two destroyers disposed on either side of us. It was a never-to-be-forgotten sight—nerves strained to their utmost tension, and everybody as keen as mustard. Sea and spray flew all over us, and covered us fore and aft. The German destroyers turned about and fled, but we had the advantage in speed, and soon got within range with our 6-inch bow gun, and opened fire.

Our captain formed up our flotilla on either bow, and, once within effective range, our 4-inch semi-automatic guns blazed away, the destroyers acting independently. The German destroyers, seeing themselves cornered, altered their course, with the intention of obtaining a better strategic position. They opened fire on us, most of the shooting being aimed at the destroyers. Lusty cheers rang from our ships as the first German destroyer disappeared. At a distance of . . . . [figures deleted] yards a 6-inch lyddite shell struck her just below the bridge. She toppled over on her beam ends like a wounded bird, then righted herself level with the surface, and finally plunged bow first, all in the space of about two minutes.

We had by this time closed to . . . . [number deleted] yards' range, and the enemy commenced firing their torpedoes. As best as we could judge they must have discharged at least eight, one missing our stern by only a few yards. Fortunately for us, we caught sight of the bubbles on the surface denoting its track and we just missed the fate of the *Aboukir*, *Cressy*, *Hogue* and *Hawke* by a hair's breadth. At 2.55 p. m. the second of the enemy's vessels was seen to be out of action, being ablaze fore and aft, showing the fearful havoc our lyddite shells were making. As each shell hit its mark, funnels, bridge, torpedo-tubes, and all the deck fittings disappeared like magic, dense fumes from the explosive, the deadliest of its kind, covering the ships fore and aft.

We actually passed over the spot where the first vessel had sunk, and just for the space of a couple of seconds, as we were tearing through the water at over 30 knots an hour, we caught sight of scores of poor wretches floating about and clinging to charred and blackened débris and wreckage. This was a truly pitiable sight, but as we had two more combatants to put out of action, to stop at such close range, even to save life, would have been courting disaster. We should merely have been exposing ourselves to torpedoes. We had to tear along and try and forget the gruesome result of our work. The second ship now a mass of seething flames, sank quite level with the water, and we soon had the remaining two literally holed and maimed. Their firing was very poor and inaccurate, although several shells flew around, throwing shrapnel bullets about. It was a marvel that none struck us.

The destroyers *Loyal* and *Lennox* got in proximity to one of the German ships. The surviving German fired her last torpedo, which, however, went wide of the mark. During these activities we had closed up with the last of the Kaiser's destroyers, and placed her *hors de combat*. The *Legion* had two men wounded. By 3.30 the action was over, and the German fleet had been reduced by four units. Then came the order to get out boats and save life. Altogether we saved two officers and 29 men. One of the officers, the captain of the destroyer *S 119*, was so badly maimed that he died shortly afterwards. The total complement of the four destroyers must have been about 240. Over 200 perished in the engagement, which lasted about an hour.—*Naval and Military Record*, 10/29.

NAVAL OPERATION ON BELGIAN COAST.—On Wednesday the British Admiralty announced that the monitors *Severn*, *Humber* and *Mersey*, were recently engaged in operations on the Belgian coast, firing on the right flank of the German Army. Owing to their light draft they were able to contribute materially to the success of the operations in this district, and they abundantly justified their acquisition on the outbreak of war.

In addition, detachments with machine guns were landed from these vessels to assist in the defence of Nieuport, where they performed meritorious service. The British losses were trifling.

The three vessels referred to were taken over, on the outbreak of war, from the government of Brazil, for which they were being built at Barrow as river monitors with the names *Javary*, *Madeira*, and *Solimoes*. They have a length of 265 feet, a draft of 8½ feet, and are of 1260 tons displacement. Their speed is 11½ knots and they carry two 6-inch guns, two 4.7-inch howitzers and four 3-pounders.

It was stated unofficially that a *Taube* aeroplane was brought down on the previous Sunday with the first shot from one of the vessels, and that a *Zeppelin* had also been destroyed. It was reported that the fire from the warships killed and wounded 1600 Germans and silenced several guns.

Thursday's news was still encouraging. On the coast between Ostend and Nieuport an artillery duel was in progress between the French and Germans, British warships aiding the French with their big guns. British aviators flew over the enemy's positions directing the fire of the Allies.

It seems that on Wednesday the British fleet celebrated the anniversary of Trafalgar, for they were in action from 6 in the morning until 6 p. m. —an excellent way of remembering Nelson's famous signal. The firing was rapid and incessant, one British vessel firing no fewer than 1000 lyddite and shrapnel shells. The fire of the squadron caused the greatest execution in the German trenches and batteries among the dunes, and between them the Allies' vessels destroyed a German battery of field artillery, dispersed a German bridging train collected to force the passage of the Yser, blew up an ammunition column, killed General von Tripp and the whole of his staff to the west of Westende, and by the fierceness of their fire compelled the enemy to evacuate its position before Nieuport. Some of the guns discharged 14 shots a minute. The damage done to the enemy was clearly discernible from the vessels. An attempt on the part of the enemy to get their range by sending up an aeroplane which dropped smoke balls was ineffective. At the end of the day the whole coast for a distance of four miles from Nieuport to Westende had been completely evacuated and was a dense mass of black smoke and flame. It was afterwards reported that in the action the Germans lost at least 4000 killed and wounded.

On Sunday the Admiralty announced that throughout Saturday the monitors and other vessels of the British bombarding flotilla fired on the German right, which they searched thoroughly and effectively in concert with the operations of the Belgian Army. All German attacks on Nieuport were repulsed. Much damage was done to the enemy by naval fire which enfiladed the German lines, and the enemy prisoners taken testified to the heavy losses they suffered from this cause. Fire was also opened in the afternoon on the German batteries near Ostend.

Admiral Hood has a fine flotilla of vessels very suitable for this work, but at the same time not of great naval value. During the day our ships were persistently attacked by an enemy submarine and torpedoes were fired at the *Wildfire* and the *Myrmidon*. Other British vessels attacked the submarine and the naval aeroplanes and balloons aided in the direction of the fire. The weather continued fine and favorable. No losses were sustained by our flotillas.

The Secretary of the Admiralty issued the following announcement:

"A German submarine has been rammed and sunk by the destroyer *Badger* off the Dutch coast. The *Badger's* bows were somewhat damaged." —*United Service Gazette*, 10/29.

"HELA" SUNK.—Yet another German light cruiser has suffered disaster. This time it is not one of the new *City* type, but an old vessel, the *Hela*, built at Bremen in 1895. A torpedo was the means of sending her to the bottom, and on the arrival of *E 9* at Harwich on Wednesday it was officially announced that it was this unit of the British submarine flotilla which discharged it. *E 9*, which is one of the latest British submarines and was only delivered by Messrs. Vickers early this year, is under the command of Lieutenant Commander Max K. Horton. From the German side, the information received via Copenhagen is that on the morning of September 13 the cruiser was sunk by a torpedo discharged by a hostile submarine at a place not mentioned. Nearly all the crew were saved. The announcement is signed by Captain Behncke, Assistant Chief of the Admiralty Staff. The *Hela* was of 2000 tons displacement, originally designed for 20½ knots. With an armament of four 3.4-inch and six 4-pounder guns and three torpedo-tubes, she was weaker than the *Ariadne*, of 2645 tons, which was sunk in the Heligoland affair. Her complement numbered 168 officers and men.—*Army and Navy Gazette*, 9/19.

SUBMARINE "E 3" DESTROYED

AMSTERDAM, October 22.

An official telegram from Berlin states that the British submarine *E 3* was destroyed last Sunday afternoon (October 18) in a German bay on the

North Sea. There were, it is added, no losses on the German side.—*Press Association War Special.*

Submarine *E 3* was one of four vessels (*E 3* to *E 6*) provided for in the Estimates of 1910-11, and all built at Barrow by Messrs. Vickers & Co. The craft, which were launched in 1912, were almost identical with the two earlier *E* type boats, their principal dimensions being: Length, 176 feet; beam 22½ feet; submerged displacement, 800 tons. With a horse-power of 1600 the vessels are capable of 15 knots on the surface. They are armed with a disappearing 12-pounder gun, and possess three torpedo-tubes. The complement of these boats is 28 officers and men.—*Naval and Military Record*, 10/28.

LONDON, October 7.

Submarine *E 9* of the British Navy, under command of Lieutenant Commander Max K. Horton, yesterday made another raid into German waters off the mouth of the River Ems and succeeded in sinking a German torpedo-boat destroyer.

The sinking of the German destroyer, the Admiralty announces, took place at 1 o'clock in the afternoon, and was witnessed by the Dutch coast guards on the Dutch island of Schiermonnikoog, in the North Sea, off the province of Friesland. The weather was clear and the sea calm, and the destroyer could plainly be seen cruising before the mouth of the Ems. Suddenly the observers saw a high column of water rise near the bow of the destroyer. The vessel immediately turned over and sank in three minutes.

Shortly after the explosion the periscope of the submarine came above the surface of the water for a moment, but as soon as those on board the plunger saw that their torpedo had struck its mark the vessel was again submerged.

A German cruiser and torpedo-boat came quickly to the rescue of the crew of the destroyer. Survivors were swimming about in the vicinity of the disaster, or clinging to the wreckage of their sunken ship.

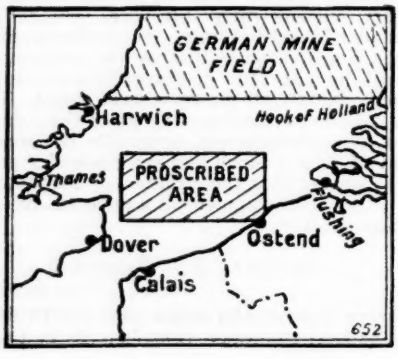
As Schiermonnikoog is close to the island of Borkum, where the Germans have a naval base, and within 60 miles of Heligoland and the naval arsenal at Wilhelmshaven, the dash of the submarine is considered here to have been a particularly daring one.

The Dutch naval staff announces that the sinking of the destroyer occurred miles off Schiermonnikoog and well outside Dutch territorial waters. —*New York Times*, 10/8.

BRITISH MINES SOWN.—The Secretary of the Admiralty communicates the following:

The German policy of minelaying, combined with their submarine activities, makes it necessary on military grounds for the Admiralty to adopt

THE NEW MINE FIELD



counter-measures. His Majesty's Government have therefore authorized a minelaying policy in certain areas, and a system of minefields has been established and is being developed upon a considerable scale.

In order to reduce risks to non-combatants, the Admiralty announce that it is dangerous henceforward for ships to cross the area between

Latitude 51° 15′ N. and 51° 40′ N. and
Longitude 1° 35′ E. and 3° E.

In this connection it must be remembered that the southern limit of the German mine field is Latitude 52° N. Although these limits are assigned to the danger area, it must not be supposed that navigation is safe in any part of the southern waters of the North Sea.

Instructions have been issued to his Majesty's ships to warn East-going vessels of the presence of this new mine field.

Owing to the presence of sand banks in and near the mouth of the Thames, the deep-water channel between the new mine field and the Essex coast is less extensive than appears from the map.—*London Times*, 10/3.

GERMAN MINES IN THE SCHELDT

AMSTERDAM, October 17.

According to the *Handelsblad*, the Germans have laid mines in the Scheldt near Antwerp from Bath, which lies at the southeastern extremity of South Beveland, Zeeland. Captains of vessels en route for Antwerp are said to have been requested to ask for instructions at Hanswerht, to the northwest of Bath.—*London Times*, 10/19.

BRITISH SUBMARINE "D 5" SUNK BY CRUISER

LONDON, November 3.

The British submarine *D 5* was sunk in the North Sea early this morning by a mine which was thrown out by a German cruiser which was retreating before British cruisers. Two officers and two men of the submarine were saved.

This information is contained in an Admiralty report issued here tonight.

The report says a German squadron fired on the British gunboat *Halcyon*, which was patrolling, wounding one man.

"Various naval movements were made," the report continues, "as a result of which the Germans retreated rapidly, and, although shadowed by the light cruisers, they could not be brought into a sea action.

"The rearmost German cruiser, in her retirement, threw out a number of mines, and the submarine was sunk by one of these."

In connection with the sinking of the British submarine *D 5* by a mine dropped from a German cruiser a dispatch to the *Central News* from Lowestoft says:

"The enemy attacked the *Halcyon*, the chief fishery-protection cruiser at Lowestoft. One seaman is reported to have been badly injured and taken to a hospital.

"The vessel itself had her wireless and her bridge damaged and her funnel pierced. She has returned to Lowestoft."—*New York Times*.

GUNBOAT "NIGER" DESTROYED.—The little British torpedo gunboat *Niger* of 810 tons, which was built in 1892 and has been used as a tender, was torpedoed by a German submarine November 11 in the Downs north of the Straits of Dover and foundered immediately. She had a complement of 85 officers and men. The officers and crew were saved. The Admiralty in announcing the loss of the ship says:

"The *Niger*, Lieutenant Commander Arthur T. Muir, was torpedoed this morning (November 11) in the Downs. All the officers and 77 of the crew were saved. Four men were injured. It is thought that there was no loss of life. The *Niger* has been employed in semi-combatant duties."—*Army and Navy Journal*, 10/17.

"AUDACIOUS" SUNK.—One of the most curious and baffling incidents of the war has been the report of the sinking by a mine of the British dreadnought *Audacious*. The report reached this country by mail on Saturday of last week and seems to have received confirmation from eye-witnesses of the event. This mishap, according to these accounts, occurred on the morning of October 27, off the north coast of Ireland, and the news has been suppressed by the British censorship until revealed in letters sent by mail. The *Audacious* is said to have been struck by a mine, and, in response to wireless signals, the White Star steamship *Olympic* went to her assistance. The *Olympic* successfully rescued the officers and crew of the dreadnought, only two lives being lost in the process, and after attempts to take her in tow had proved unsuccessful, the disabled vessel was sunk by orders of the British Admiralty. The *Olympic* put into Lough Swilly, where she was detained, incommunicada, for a week, and finally docked at Belfast, when her passengers were requested to preserve silence on what they had seen. —*New York Nation.*

"OCEANIC" LOST.—September 9th the armed merchant cruiser *Oceanic*, of the White Star Line, went ashore on the North Coast of Scotland and became a total loss, but all officers and crew were saved.—*Naval and Military Record*, 9/16.

BALTIC

VALUE OF RUSSIAN FLEET AS A RETAINING FORCE.—*Work of the Russian Fleet.*—The inutility of the Russian War Fleet, locked up as the major part of it is in the Baltic and Black Sea, is being deplored by those who do not appear to have yet fully grasped the real ramifications and influence of sea power. The Russian fighting ships, moored safely, or riding on cables ready to slip at a moment's notice, behind the minefields and under the protection of the guns of land forts in the harbors and estuaries along the coast of Russia in the Baltic, are factors of consequence in German war arrangements. Germany must keep a containing and retarding sea force in the Baltic to prevent that sea becoming a Russian lake, from whence Konigsberg and Dantzig, and half-a-dozen other places, could be attacked and destroyed. Every German warship required to prevent the Tzar landing his legions on the German coast in the Baltic is a ship less to launch against the Grand Fleet of Britain in the North Sea, if it ever becomes necessary for the Kaiser to adopt that hazard. Russia would not fail to take advantage of a reduced German fleet in the Baltic to do a little on her own account in those waters. The Russian ships which stand and wait near Petrograd, therefore, exercise influence on the North Sea operations, and may yet have an opportunity of dealing the Germans no light blow, both ashore and afloat, in that sphere of operations.—*United Service Gazette*, 9/17.

RUSSIAN MINES LAID

PETROGRAD, October 17.

In view of the presence of German submarines at the entrance to the Gulf of Finland, and the placing by the enemy of booms and torpedoes near the Russian coast, the Imperial Government announces that the Russian naval authorities are compelled in their turn to have recourse largely to similar steps. Consequently navigation in the northern zone bounded by the Russian coast by parallel 58 deg. 50 min. North lat., and by the meridan 21 deg. East long. is to be regarded as dangerous, as is the entrance to the Gulf of Riga and the coast waters of the Aland Archipelago.

In order that persons not taking part in the hostilities may not run the risks of war, the entrances and exits of the Gulf of Finland and Riga are to be regarded as closed from the moment of the announcement.—*London Times*, 10/19.

MEDITERRANEAN AND BLACK SEAS

The naval powers are represented in the Mediterranean as follows:

FRANCE

4 dreadnoughts.
18 pre-dreadnoughts.
(All carry 12-inch guns.)
20 armored and protected cruisers.
11 light cruisers.
(Several of these were abroad at the opening of the war.)
84 destroyers.
153 torpedo-boats.
(Most of these are small and probably suitable only for harbor defence work.)
70 submarines.

GREAT BRITAIN

3 battle cruisers.
4 armored cruisers.
16 destroyers and depot ships.
2 gunboats.
6 submarines.
(3 at Malta; 3 at Gibraltar.)
16 torpedo-boats.

AUSTRIA-HUNGARY

3 dreadnoughts.
(Only the dreadnoughts and 3 of the pre-dreadnoughts are armed with 12-inch guns. The others carry 9.4-inch weapons.)
12 pre-dreadnoughts.
2 armored cruisers.
12 light cruisers.
(Including 3 nearing completion at the outbreak of the war.)
19 destroyers.
11 submarines.
58 torpedo-boats.
(These torpedo-boats are only 200 tons or smaller; armed for the most part with 3-pounders.)

BLACK SEA FLEETS

TURCO-GERMAN

BATTLE CRUISER

Launched	Name	Displacement	Armament
1911	Goeben	23,640	10 11-in. 12 6-in.

BATTLESHIPS

1891	Torgut-Reia	9,901	6 11-in. 8 4-in.
1891	Kheyr-ed Din		

CRUISERS

1911	Breslau	4,500	12 4.1-in.
1903	Hamidieh	3,800	2 6-in. 8 4.7-in.
1903	Medjidch		

10 destroyers.
7 torpedo-boats.
12 gunboats.

RUSSIAN

BATTLESHIPS

Launched	Name	Displacement	Armament
1906	Ioann Ziztoust	12,733	4 12-in. 4 8-in. 12 6-in.
1906	Evestafi		
1900	Pateleimon	12,582	4 12-in. 16 6-in.
1896	Rostislav	9,000	4 10-in. 8 6-in.
1893	Tri-Sviatitelia	12,500	4 12-in. 10 6-in.

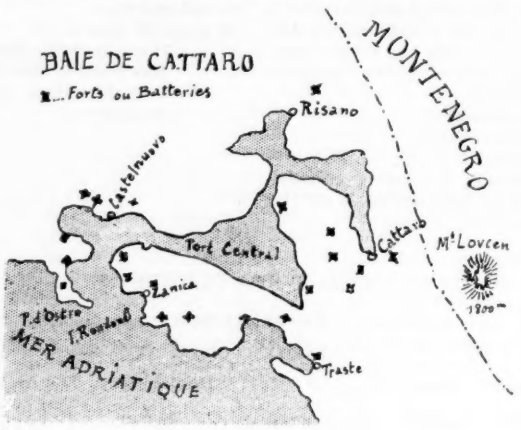
CRUISERS

1902	Raul	6,675	12 6-in. 12 3-in.
1903	Pomyat Mercuria		

20 destroyers.
4 torpedo-boats.
10 submarines.

—*Naval and Military Record*, 11/11.

NAVAL OPERATIONS IN THE ADRIATIC.—After entering the Adriatic the Franco-English forces could not steam full speed away to the north to reach Pola, Austria's principal dockyard and base of Francis Joseph's



main fleet. It was necessary to go slow, and the following operations had to be undertaken:

1. To establish a very strong base.
2. To drag carefully for floating mines, which were sown in profusion.
3. To abolish hostile surveillance through semaphores, undersea cables, and especially wireless telegraphy.

The question of selecting a base was promptly settled. Cattaro immediately called the attention of the commander-in-chief on account of its geographical situation and general conditions. That magnificent bay whose greater axis is 30 kilometers long, is deserving of a regular investment. With its four sheltered and fortified harbors, it presents every security for a naval base of the first order. The lower bay on the left on entering has the port of Castelnuovo. Steering well to the east, one then enters the

second bay (Port Central), which is the largest. Thence the course, north northeast, leads to the bays of Risano and Cattaro through the Catene Channel which is only 250 meters wide and is commanded by Fort Tanta Croce.

During the whole month of September, the Allies intermittingly bombarded the fortifications bordering on the sea. The battleships fired from a distance of 14,000 meters, thus preventing the land fortifications from returning the fire owing to the shorter range of their guns.

As early as September 25, the heavy guns had dismantled the entrance forts, but as the shells could not reach the upper part of the bay, the Allies transferred a reinforcement battery to bombard the rear of the front line, to the top of Lovcen Hill (from which the Montenegrins carried on an artillery duel with the Austrians).

The sweeping of the mines by the British and French torpedo-boats goes on without interruption, they drag methodically for those dangerous engines. On the coast of Antivari our sailors exploded two strings of mines, and picked up more than one thousand of them in the bay of Cattaro.

Finally, the clearing of the Southern Adriatic is kept on actively and methodically. On September 22, the French destroyed the Pelagosa lighthouse, 80 miles to the south of Lissa. The Austrians had established there a wireless station, with an apparatus on the lighthouse. It was necessary to destroy that dangerous spy, which would not have failed to signal every move of the Allies. For the same reasons, our vessels demolished the Lissa lighthouse and took possession of the island of the same name. It is a strategical point of great importance, where in 1866, Admiral Teghetof defeated the Italian Admiral Persano. The port in the island forms a base capable of facilitating future operations. A French destroyer has isolated Lissa by cutting the submarine cable which connected it with the Island of Lesina. Our sailors have destroyed the Punta Struga lighthouse on Lagosta Island.

Another point, the Dalmatian Archipelago, is subjected to an active vigilance. It is an inextricable network of islets and channels facilitating ambuscades on the part of flotillas of submarines and destroyers. To prevent any untoward event, the squadron in heading to the north, must efficiently secure its rear and right flank.

Indeed, it is a question whether our squadron will be able to force the Austrian battleships to come forth from their shelter in Pola. This is rather doubtful if we consider the inequality of the contending forces.

In the month of September, one part of the fleet assured the passage from Port Said to Marseille of 50,000 Hindu troops, who as soon as disembarked were forwarded to the front.—*The Navy*, November.

FAR EAST

Naval powers in the Far East are represented as follows:

FRANCE

2 armored cruisers.
1 destroyer.
1 gunboat.
4 river gunboats.

GREAT BRITAIN

1 battleship.
2 light cruisers.
2 cruisers.
8 destroyers.
4 torpedo-boats.
3 submarines.
10 river craft.
6 sloops.
Some other small craft.
(The armored cruisers have a speed of from 20 to 25 knots, and the destroyers, 26 knots.)

JAPAN

2 dreadnoughts.	13 light cruisers.
13 pre-dreadnoughts.	52 destroyers.
2 battle cruisers.	27 torpedo-boats.
13 armored cruisers.	15 submarines.

SHELLS FROM TSING-TAU CRIPPLE THE "TRIUMPH"—MINE DESTROYS THE "TAKACHIHO"

WASHINGTON, October 19.

Shell fire from howitzers in the German fortress of Tsing-tau heavily damaged the British battleship *Triumph* and compelled her to withdraw from the British-Japanese bombarding fleet, according to a statement issued by the German Embassy, based on dispatches from the Far East by way of San Francisco.

TOKIO, October 19.

It is officially announced that the Japanese cruiser *Takachiho* was sunk by a mine in Kiao-chow Bay on the night of October 17. One officer and 11 members of the crew are known to have been saved.

The *Takachiho* was on patrol duty outside Tsing-tau when she fouled the mine. Japanese destroyers heard the explosion and saw the flames. They hurried to the assistance of the cruiser, which, however, disappeared quickly, and in the darkness it was possible to rescue only 12 men. Twenty-eight officers, 54 non-commissioned officers, and 189 seamen perished.

It is announced that a typhoon has struck Kiao-chow, destroying the landing pier. Twenty Japanese sailors were drowned.

The Japanese cruiser *Takachiho* was built in 1885 and refitted in 1900. She was a vessel of 3700 tons and was 300 feet long and 46 feet beam. Her main battery consisted of eight 6-inch guns, and her speed was about 18 knots. The *Takachiho* had a crew of 283 officers and men.

The battleship *Triumph* was built for the Chilean Navy, and was purchased by the British Admiralty before she left England. Her dimensions are: Length, 436 feet; beam, 71 feet. The *Triumph* has a speed of 19½ knots and an armament of four 10-inch, fourteen 7.5-inch guns, and 22 small quick-firing guns. She is commanded by Captain Edward H. Rymer, and went out to Hongkong in October, 1913, as a receiving ship. She has about 30 officers on board in addition to her complement, which is about 800 all told. —*New York Times.*

"S 90" DESTROYED

TOKIO.

It is officially announced that the German torpedo-boat *S 90*, which escaped from Tsing-tao in the dark, has been found aground destroyed 60 miles south of Kiao-chow.—*Press Association War Special.*

Torpedo-boat destroyer *S 90* was one of a class of 12 boats launched at Elbing in 1900. They are of 350 tons displacement, 200 feet long, 23 feet beam, and 8.9 feet draft. With an indicated horse-power of 6000, the engines are capable of 27.5 knots per hour. The craft have two screws and are armed with three 3-pounder guns and three torpedo-tubes. Their complement is about 60.—*Naval and Military Record*, 10/21.

THE FALL OF TSING-TAO.—The following official statement was issued at the British War Office on the afternoon of November 8:

"The German and Japanese plenipotentiaries concluded on the evening of November 7 (yesterday) the pourparlers concerning the conditions for the surrender of Tsing-tao. Our terms were accepted in their entirety. On November 10 (Tuesday) the forts will be turned over. Our casualties on the night of November 6 and the following morning, when the forts

were captured, were 14 officers wounded and 426 soldiers killed or wounded. We took 2300 prisoners in the battle."

A message received at the navy yard at Esquimault from the commander-in-chief of the Japanese second squadron, which bombarded Tsing-tao, said: "The following vessels were found by us sunk by explosives in Kiao-chow Bay: *Jaguar, Luchs, Iltis, Kormoran, Tiger, Taku* and *Rachin*, which was a mine-boat, and in addition the *Kaiserin Elizabeth*." All of these ships with the exception of the last named were German. The *Kaiserin Elizabeth* was Austrian.

The Japanese torpedo-boat *No. 33* was sunk by a mine at the mouth of Kiao-chow Bay, while dragging for mines on November 11. Six men were killed or wounded and three are missing.

It was in the middle of September that the real attack upon Tsing-tao began, although the preparations for the taking of the German stronghold in Asia were begun immediately after war was declared by Japan, on August 15. In the last two days of the fighting, it is stated, the warships continued a terrific rain of shells on the fortress and the city from the east and south, inflicting great damage and havoc. The Germans made desperate efforts to repair the damages to their batteries, but without success. Japanese shells killed the men at work and demolished the batteries anew. Projectiles from the Japanese warships started fires in several streets of the city, certain parts of which were burned.

For two months the little German garrison, nearly wholly composed of reservists who were living or doing business in China, held out against the land and sea attacks of the Japanese and of certain British detachments of both white and Indian troops that found themselves in China at the outbreak of the war. What the losses of the garrison have been are not known, but the official Japanese and British reports have indicated that Tsing-tao was taken at heavy cost of men on the part of the Allies.—*Army and Navy Journal*, 11/14.

CHINA'S STRONG PROTEST TO JAPAN

PEKING, October 7.

Japanese troops having been sent to Tsinanfu station, contrary to the wishes of the Chinese, the amicable arrangement for the working of the Shantung Railway until the end of the war has been rendered abortive.

China now only submits to the Japanese occupation under strong protest. In a note to-day she requested Japan to withdraw her troops and asked for a reply to this and other notes.

AMICABLE AGREEMENT WITH CHINA

PEKIN, Sunday.

The President and high officials, after strenuous endeavors, came to a peaceful arrangement with Japan for the control of the Shantung Railway.

An agreement has been made that the Japanese shall temporarily control the administration, while the traffic shall be conducted by the Chinese. The fate of the railway is to be decided at the end of the war. This amicable settlement should remove any danger of armed conflict with the Japanese.

The Chinese Government are not prepared, however, to accept the contention set out by Japan in her reply to China's protest—that the railway is purely German, and that she is entitled to occupy it as part of the German leased territory.—*Naval and Military Record*, 10/7.

"KOENIGSBERG" BOTTLED UP.—The German cruiser *Koenigsberg* on October 30 was bottled up in a German East African river by the British cruiser *Chatham*, a sister ship to the *Sydney*, where her final destruction is a foregone conclusion. The report of the British Admiralty early on November 11 tells in brief the story as follows:

"After the whereabouts of the *Koenigsberg* had been indicated by the attack on the *Pegasus*, on September 19, a concentration of fast cruisers was arranged by the Admiralty in East African waters and a thorough and prolonged search by these vessels in combination was made. This search resulted October 30 in the *Koenigsberg* being discovered by H. M. S. Chatham, Captain Sidney R. Drury-Lowe, hiding in shoal water about six miles up the Rufiji River, opposite Mafia Island, German East Africa. Owing to a greater draft, the *Chatham* could not reach the *Koenigsberg*, which probably is aground, except at high water. Part of the crew of the *Koenigsberg* has been landed and is intrenched on the banks of the river.

"Both these intrenchments and the *Koenigsberg* herself have been bombarded by the *Chatham*, but owing to the dense palm groves amid which the ship lies, it is not possible to estimate the damage done. Pending operations for her capture or destruction, effective steps have been taken to block the *Koenigsberg* by sinking colliers in the only navigable channel to the river, and she is now imprisoned and unable to do any further harm. The fast vessels which have been searching for her are thus released for other service.

The *Koenigsberg* has preyed on British shipping since the beginning of the war, but her successes have in no way approached those of the *Emden*. She disabled the British cruiser *Pegasus* in Zanzibar Harbor on September 20. The *Pegasus* was caught at a disadvantage, as she was dismantled and was undergoing repairs. Twenty-five of her crew were killed and 80 wounded.

The *Koenigsberg* is a protected cruiser, laid down in 1905. She is of 3348 tons, 354 feet long, and has a speed of 23½ knots. Her main battery consists of ten 4.1-inch guns.

The British cruiser *Chatham* is a sister ship to the *Sydney*.—*Army and Navy Journal*, 10/17.

The elusive and fleet German cruiser *Emden*, Captain von Muller, which during her three months of cruising in the Bay of Bengal, the Indian Ocean and other Asiatic waters has destroyed 23 British merchant vessels and one Russian, one French and one Japanese warship, met her fate on November 10, when she was destroyed by the Australian cruiser *Sydney* at Cocos Island. She tried to escape from her fleeter and more powerful adversary, the *Sydney*, but she was cornered, forced to fight and with her hull riddled with shot was driven ashore on fire and burnt. She lost many of her complement of 321 officers and men.—*Army and Navy Journal*, 11/17.

Later advices from the British Admiralty on November 11 report that Captain von Muller, of the *Emden*, and Prince Franz Joseph of Hohenzollern, one of his officers, are both prisoners of war, and neither is wounded. The Admiralty adds that the losses on the *Emden* are unofficially reported as 200 killed and 30 wounded. The Admiralty has given directions that all honors of war be accorded to the survivors of the *Emden*, and that the captain and his officers are not to be deprived of their swords.

The shipping destroyed by the *Emden* is estimated to have had a value of at least $10,000,000, and her career had become quite famous and romantic.

The *Emden* had a complement of 361 men and her best speed was 25.1 knots. Her armament consisted of ten 4.1-inch guns, eight 5-pounders and four machine guns. She could fire four guns of her main battery ahead and astern, and five from each broadside. She also was equipped with two submerged 17.7-inch torpedo-tubes. The cruiser displaced 3600 tons. She was 387 feet long and had a beam of 43 1-3 feet. She was laid down at Dantzig in 1906, and completed in May, 1908.

The Australian cruiser *Sydney* carries a main battery of eight 6-inch guns, thus giving her a heavy advantage over the German ship. The

Sydney has a speed of 26 knots and was completed in 1913. She is a vessel of 5600 tons, with a length of 450 feet and a complement of 376 officers and men. She can fire three of her 6-inch guns ahead or astern and five on each broadside.

A correspondent in a cable to the *New York Times* on November 12 from Keeling, Cocos Islands, describing the visit of the German cruiser *Emden* there on November 9 and her subsequent fight with the Australian cruiser *Sydney*, says, in part:

"At six a. m. a four-funnelled cruiser arrived at full speed at the entrance to the lagoon. Suspicions were aroused, for she was flying no flag and her fourth funnel was obviously a dummy made of painted canvas. Therefore the men ashore were not altogether surprised at the turn of events. The cruiser lowered an armored launch and two boats, which came ashore and landed on the coral beach three officers and 40 men, all fully armed and having four Maxim guns.

"The Germans—for all doubt about the mysterious cruiser was now at an end—at once rushed up to the cable station, and, entering the office, turned out the operators, smashed the instruments and stationed armed guards over all the buildings. All knives and firearms found in possession of the staff were confiscated. In spite of the excitement a general call was sent out just before the wireless apparatus was blown up.

"All of the staff employees were arrested and under guard while the instruments were being destroyed, but it is only fair to say that the Germans, working in well disciplined fashion under their officers, were most civil. There was no such brutality as the islanders had heard characterized the German army's behavior toward civilians, and there were no attempts at pillaging. The crew of the launch grappled for the cables and tried to cut them, but, fortunately, without success. The electrical stores were then blown up.

"At nine a. m. the islanders heard the siren of the *Emden*. This was evidently a signal to the landing party to return, for they dashed for their boats. The *Emden* got under way at once, however, and the boats were left behind. Looking eastward, the islanders could see a warship, which, it was afterward learned, was the Australian cruiser *Sydney*, coming up at full speed in pursuit.

"The *Emden* did not wait to discuss matters but, firing her first shot at a range of about 3700 yards, steamed north as fast as she could go. At first the firing of the *Emden* seemed excellent, while that of the *Sydney* was somewhat erratic. This, it was afterward learned, was due to the fact that the Australian cruiser's range finder was put out of action by one of the only two shots the Germans got home. However, the *Sydney's* gunners soon overcame any difficulties this may have caused and settled down to their work, so that before long two of the *Emden's* funnels had been shot away. She lost one of her masts quite early in the fight.

"Both blazing away with their big guns, the two cruisers disappeared.

"Early next morning, Tuesday, November 10, the *Sydney* returned and anchored off the island. From members of the crew some details of the running fight with the *Emden* were obtained. The *Sydney*, having the advantage in speed, was able to keep out of range of the *Emden's* guns and to bombard the enemy with her heavier metal. The engagement lasted 80 minutes, the *Emden* finally running ashore on North Keeling Island, an utter wreck. Only two German shots proved effective. One, which failed to explode, smashed the main range finder and killed one man. The other killed three men.

"Each of the cruisers tried to torpedo the other, but both were unsuccessful, and the duel proved a contest in hard pounding at long range. The *Sydney's* speed during the fighting was 26 knots and the *Emden's* 24 knots."
—*Army and Navy Journal*, 11/17.

THE "EMDEN" NEVER TALKS

LONDON, November 1.

Under the heading, "Why the *Emden* Lives," *The Standard* publishes the following letter from the wife of the captain of the steamer *Kabinga*, one of the *Emden's* victims:

"They (the Germans) destroyed our wireless the first thing. The *Emden's* officers told us they listened to all the various ships talking, but never talked themselves, and that our naval ships were careless and used no codes, and that they knew the whereabouts of all in these eastern stations, and knew just how long they could make their raid without risk of meeting an English cruiser. They were quite right, for we had no protection in the bay whatever, and they did what they pleased."

"EMDEN" IN BOLD RAID SINKS 2 WARSHIPS

TOKIO, October 29.

The British Embassy hears that the German cruiser *Emden*, flying the Japanese flag and disguised by the addition of a fourth smokestack, entered Penang, a British possession in the Straits Settlements, and fired torpedoes which sank the Russian cruiser *Jemtchug* and a French destroyer.

Two officers and 84 seamen on board the *Jemtchug* were killed.

The *Emden's* entrance into the waters of Penang was audacious. She came in under the guns of the fort, and after sinking the cruiser and the destroyer escaped through the Strait of Malacca.

Merchant vessels belonging to the belligerent nations are taking refuge at Colombo, Ceylon.

The Russian cruiser *Jemtchug* was a vessel of about 3100 tons, and was laid down in 1902. Her main battery consisted of six 4.7-inch guns, and she had a speed of 24 knots. She carried a crew of 334 men. After the battle of the Sea of Japan, during the Russian-Japanese War in 1905, the *Jemtchug* was interned at Manila.

NAVAL VIEW OF "EMDEN'S ACT

WASHINGTON, October 29.

The German cruiser *Emden* broke no international rule of naval warfare when she entered Penang flying the Japanese flag, and fired torpedoes which sank the Russian cruiser *Jemtchug* and a French destroyer, according to American navy officers.

The rule recognized by the American and British navies is that a belligerent warship may carry a "form" flag up to the time she fires the first shot, but the vessel must fly her own national ensign before she does fire the first shot, and when engaged must fight under her own colors. On land the rules of civilized warfare are different. They forbid the use of the enemy's flag for purposes of deceit. On the sea the national flag of an armed vessel must be displayed before an engagement begins or a capture is made, but there is nothing forbidding the flying of the enemy's or other pennant for purposes of surprise up to the time the first shot is fired.—*New York Times.*

PACIFIC

GERMANY

West coast North America

Scharnhorst *Gneisenau*	armored cruisers.	*Nurnberg* *Leipzig* *Dresden* **Karlsruhe*	light cruisers.

* Last heard of in the West Atlantic.

ENGLAND

East Indies.
1 battleship.
2 light cruisers.
Persian Gulf.
4 small craft.
Cape of Good Hope.
3 cruisers.
1 gunboat.
New Zealand.
3 cruisers.
1 sloop.
Royal Australian Navy.
1 battle cruiser.
3 light cruisers.
3 destroyers.
2 submarines.
West coast Canada.
2 submarines.
West coast of America.
2 gunboats.

It is reported that about 20 British and French ships are in South American waters and it is probable that they are co-operating with a Japanese cruiser squadron.

THE SEIZURE OF SAMOA

WELLINGTON, September 17.

The capture of German Samoa was the first task allotted to New Zealand. The advance force, which consisted of 53 officers and 1351 men, was dispatched from Wellington in two troopships on August 15. The first stage of the journey was not without risk, for the three small cruisers which constituted the escort of the expedition—the *Philomel*, the *Psyche*, and the *Pyramus*—were completely outclassed by the two German vessels, the *Scharnhorst* and the *Gneisenau*, which had left the China Seas for the South Pacific and were known to have been within striking distance of Fiji and New Zealand. This fact has been made the ground of a severe attack upon the government by critics who appear to share the view of Napoleon's admirals, that war can be waged without taking risks.

At Noumea, however, which was the first port of call, the danger disappeared, for there the expedition found the *Australia*, the flagship of the Commonwealth Navy (Rear Admiral Sir G. Patey), the *Melbourne*, one of its protected cruisers, and the French cruiser *Montcalm*, and secured this additional protection for the rest of the journey. The two Australian ships had previously been vainly hunting for the German vessels.

After a call at Suva the expedition arrived at Apia on the morning of August 30. The Germans were not prepared to offer any resistance, possession was peacefully taken of the islands in the name of King George, and the British flag displaced the German flag at the top of the staff above the government offices. The Proclamation in which Colonel Logan, the officer commanding the occupying force, declared the new sovereignty was doubtless supplied from Downing Street, and followed in substance the precedents established in cases of military occupation. But its opening clause was of an unusual, if not unique, character:

"The New Zealand Government of his Britannic Majesty King George the Fifth now occupy for his Majesty all the German territory situated in the islands of the Samoan group."

It was the fact of the New Zealand Government's being privileged to represent his Majesty that gave the occasion its novelty. New Zealand is very proud of breaking records, and she is particularly proud to have been the first of the dominions to undertake a work of this character. The comments of the Minister of Defence on the event were modest enough.

"These men [Mr. Allen said] have gone away at the request of the Imperial Government on an Imperial mission. It is a mission that was regarded as of considerable importance, more particularly because of the fact that there is a wireless installation on the island, the possession of which would be of considerable value. . . . . The future of the island is an Imperial question, in which, however, New Zealand might have something to say.

The Imperial authorities might be able to utilize the island, but that is for the Imperial statesmen to decide. We have simply done our duty as part of the Empire in carrying out the task allotted to us.

"New Zealand has now acquired a right to be consulted in regard to Samoa by something better than talk and in circumstances well calculated to enhance her sense of responsibility and extend her horizon."—*London Times*, 10/22.

AUSTRALIAN NAVAL EXPLOIT.—The following statement was issued by the Press Bureau:

The Secretary of the Admiralty announces that a telegram has been received from Rear Admiral Patey, commanding the Australian Squadron, announcing the occupation at 7 a. m., the 11th, of the town of Herbertshöhe, in the island of Neu Pommern (late New Britain), which is an island in the Bismarck Archipelago; this island lies due east from German New Guinea. The British flag was hoisted without opposition.

The naval landing party under Commander J. A. H. Beresford, Australian Navy, established themselves on shore at dawn without the enemy's knowledge; in proceeding to destroy the wireless stations its progress was stoutly opposed, and the party had to fight their way for four miles through the bush, the road being in many cases mined. The German officer in command of parties in the trench 500 yards from station surrendered unconditionally.

Guns have been landed and steps are being taken to capture the station.

In a later statement the Press Bureau says that Rear Admiral Patey telegraphs that after fighting for 18 hours over six miles of bush the Australian forces captured the wireless telegraph station at Herbertshöhe at 1 a. m. on the 12th.

The wireless tower and station were damaged by the enemy and will be out of action for some time.—*London Times*, 9/14.

GERMAN NEW GUINEA CAPTURED.—Following their capture of Herbertshöhe, in Neu Pommern, the largest island of the Bismarck Archipelago, on September 11, after sharp bush fighting, the Australian naval forces under the command of Vice Admiral Sir George Patey have taken possession of the town of Friedrich Wilhelm, in Kaiser Wilhelm's Land. The date of the occupation was September 24. There was no opposition, the troops of the enemy having been concentrated at Herbertshöhe, where they had been annihilated. The principal officers were absent, but four officials and 13 other Germans surrendered, subscribing the oath of neutrality. The officials, Sir George Patey's report added, will be engaged temporarily to assist the administration; the others are planters, missionaries and business men.—*Army and Navy Gazette*, 10/3.

IN THE PACIFIC.—Expeditions from New Zealand and Australia have now occupied all the German territories in those seas. Mr. Millen, the Commonwealth Minister of Defence, has said that immediately on the outbreak of war the Australian fleet searched for the enemy's cruisers and at the same time took all necessary measures to safeguard the trade routes. The New Zealand expedition, which had for its object the seizure and occupation of German Samoa, was covered by a naval force.

The Australian forces were not allowed to attain their objects without opposition, and suffered some loss in the capture of the town and wireless station of Herbertshöhe, in the island of Neu Pommern, where the Germans seen to have concentrated. Naura, the capital of the Marshall Islands, was afterwards seized by a strong detachment of the Australian forces, and with the destruction of the wireless station here and in the Caroline Islands, the Germans were deprived of their last wireless installations in the Pacific. Finally the town and harbor of Friedrich Wilhelm, the seat of government of Kaiser Wilhelm's Land, in German New Guinea, was occupied by

Australian forces without opposition and the British flag hoisted. Probably some of the French warships in the Pacific lent their co-operation to the Australians in these undertakings. All the German Pacific possessions are now under the control of the Japanese, Australian and New Zealand governments.—*London Times*, 10/2.

AN AUSTRALIAN CAPTURE.—The Secretary of the Admiralty issued the following in reference to the capture of the German auxiliary sailing vessel *Comet:*

The *Nusa* was commissioned to search for the *Comet* off the northeast coast of New Guinea. The expedition was entirely successful, and the *Comet* was captured with a complete wireless installation. There were no casualties, and the captain, four officers, and 52 natives were taken prisoners. The *Comet* has now been commissioned as a vessel of his Majesty's Australian Navy.—*Army and Navy Gazette*, 10/24.

JAPAN TAKES POSSESSION OF MARSHALL ISLANDS

TOKIO.

It is officially announced that bluejackets have seized unopposed Jaluit, the seat of the government of the Marshall Islands, and captured the fortifications.

The German officials surrendered, and a British merchantman in the port was released.—*Reuter.*

Note.—The Marshall Islands, a group in the Western Pacific, were annexed by Germany in 1885. They consist of two parallel chains of low coral reefs, with a total area of about 150 square miles and a population of less than 15,000.—*Naval and Military Record*, 10/7.

JAPANESE SEIZE ISLAND OF YAP.

PEKING, October 7.

According to a German news agency dispatch, Japanese forces have occupied the Island of Yap, the most important island in the Caroline group, or New Philippines, in the Pacific Ocean.

The Caroline Islands are east of the Philippines. The group is widely extended, and comprises about 680 small islands. Yap is about 1000 miles from the Island of Mindanao, one of the Philippine group. The Caroline Islands were sold by Spain to Germany in 1899.

THE ADMIRAL OF THE PACIFIC.—Occasional glimpses of naval work oversea, such as are vouchsafed to us through the Press Bureau, show the activity of the fleets of the Allied Powers in all parts of the world, not forgetting the accomplishments of our Ally in the Far East, at the Marshall Islands. These islands contained a small German garrison at Jaluit, which surrendered to the Japanese warship without offering resistance—a wise thing to do, as their war resources were small and they were hundreds of miles from any possible support. Germany has now lost her last foothold in the Pacific, and her crowned admiral of those waters is a flag officer without a single effective base for the three or four commerce destroyers which he still has in some part of the Pacific Ocean, but which may be captured or sunk at any moment. It is a tattered and ragged command for so great a man. The Marshalls are well away to the north of Australia and New Guinea, and are of little use to anybody except as a position for a wireless station helping to cover the broad expanse of the Pacific, and communicate with vessels crossing, as high up as the "rolling forties," from the coasts of China and Japan to the American coast. Japan, apparently, intends her occupation to be only temporary, and it is a part of the work she has set herself in hauling down the flag of the so-called Admiral of the Pacific in those waters.—*United Service Gazette*, 10/15.

FLEETS CLASH IN PACIFIC

VALPARAISO, CHILE, November 3.

The German warships *Gneisenau, Scharnhorst, Nürnberg, Leipzig,* and *Dresden* to-day attacked the British fleet off Coronel, Chile.

Admiral Graf Von Spee, commander of the German fleet in Pacific waters, arrived here this morning and made the following report of the engagement which took place off Coronel:

"On Sunday, November 1, between 6 and 7 o'clock in the evening, during a heavy rain and rough weather off Coronel, we sighted the British men-of-war *Good Hope, Monmouth,* and *Glasgow* and the armored cruiser *Otranto.*

"An engagement ensued immediately. All the ships opened a brisk cannonade with all their artillery.

"The *Monmouth* was sunk and the *Good Hope,* after a great explosion on board, took fire.

"Her subsequent fate is unknown, owing to darkness having set in. The *Glasgow* and the *Otranto* also were damaged, but the darkness prevented our obtaining knowledge of the extent of it.

"Our ships, the *Scharnhorst* and *Nürnberg,* were not damaged. The *Gneisenau* had six men wounded. The rest of our ships also were undamaged."

The German armored cruisers *Scharnhorst* and *Gneisenau* are sister ships, and are the only two of their class. They are rated at a mean speed of 22½ knots, although the *Gneisenau* has made 24.8 knots, but her sister ship has fallen far below that, being officially rated as having a speed of about 21 knots. Each cruiser has a displacement of 11,600 tons, is 450 feet on the water-line, has a beam of 71 feet, and carries 765 men. Their guns and armor are similar. There are eight 8.2-inch guns in the main battery, with six 6-inch forming the secondary battery, and twenty 24-pounders and four machine guns in the auxiliary battery.

In battle these cruisers can fire on the enemy with four 8.2-inch and two 6-inch guns, both fore and aft, and their broadsides consist of six 8.2-inch and three 6-inch guns.

They were launched in 1904 and 1905 and completed in 1907. In 1909 the *Scharnhorst* went ashore and was badly damaged and has never since been able to steam so well as when first put in commission.

The *Nürnberg* belongs to the *Stettin* class of three ships, and was launched in 1906. She has a displacement of 3450 tons, is 360 feet long, with a beam of 44½ feet, is rated as having a speed of 24½ knots, and has a crew of 295 men. She was built at the Kiel yard in 1908, and cost about $1,600,000. Her armament is light, consisting of ten 4.1-inch guns in the main battery, with a secondary battery of eight 5-pounders and four machine guns. She has two submerged torpedo-tubes. Her armor is only 2 inches thick.

The *Dresden* is similar to the *Nürnberg,* except that she is 395 feet long, with a beam of 43½ feet and a displacement of 3600 tons, and a complement of 321 men. She was completed in 1909, and has a speed of 25.1 knots. Her armament and armor are exactly the same as the *Nürnberg's,* and the vessels when in action can use four 4.1-inch guns fore and aft, and have broadsides of five 4.1-inch pieces.

The *Leipzig* is of the same general light cruiser class, and was completed in 1906. Her speed is rated at 23 knots, with a displacement of 3250 tons, and both her armament and armor are the same as that of the *Dresden* and *Nürnberg,* and she carries a crew of 286 men. She brings the same guns to bear in engagement.

Since the beginning of the war the operations of these German cruisers have been shrouded in mystery. On more than one occasion they have been reported captured. The *Leipzig* has been operating in the Pacific, and has been reported south and west from San Francisco. Early in October she

sank the tank steamer *El Sinore* off the Central American coast, and has often been reported in pursuit of British merchantmen or to be fleeing from British cruisers. The *Dresden* has been reported in Pacific waters several times. Last August she sank a British steamer off the coast of Brazil. The last definite report of the *Scharnhorst* and *Gneisenau* was on September 22, when they shelled and destroyed Papeete, the capital of the French Island of Tahiti, in the Society group in the Pacific Ocean. During the bombardment they also sank the dismantled French gunboat *Zelee,* which was lying in the harbor.

The *Good Hope,* which is reported to have been sunk, was the flagship of the British squadron, of which Rear Admiral Sir Christopher Cradock was in command. She was one of the older vessels of the British Navy, having been launched 13 years ago. The *Good Hope* was the largest vessel engaged, having a displacement of 14,100 tons. She was 500 feet long, 71 feet beam, and was supposed to have a speed of 24 knots. Her armament consisted of two 9.2-inch guns, mounted in single turrets fore and aft, sixteen 6-inch, fourteen 3-inch, three 3-pounders, and two torpedo-tubes. In action she could use one 9.2-inch gun and four 6-inch guns both fore and aft, and her broadside consisted of two 9.1 and eight 6-inch guns. She carried a complement of 900 men and cost more than $5,000,000. The *Good Hope* represented England at the Jamestown Exposition in 1907.

The British light cruiser *Glasgow,* which took refuge at Coronel, was completed in 1911 and belonged to the *Bristol* class of five ships. She is 430 feet long, 47 feet beam, and has a displacement of 4820 tons. Her speed is rated at a little more than 25 knots and she carries 376 officers and men. Her armament is two 6-inch guns in turrets fore and aft and ten 4-inch guns with two torpedo-tubes.

The cruiser *Monmouth,* which is reported sunk, belonged to the county class of cruisers, and was completed in 1903. She had a displacement of 9800 tons with a length of 440 feet, a beam of 66 feet and was rated as having a speed of 23 or 24 knots. She carried 678 officers and men and had the heaviest armament of the British vessels, consisting of fourteen 6-inch guns, eight 3-inch, and three 3-pounders, with two torpedo-tubes.

The engagement was fought in the teeth of a norther that assumed almost hurricane proportions. Small boats could not live in the sea. The heavy weather militated against the larger ships and the *Good Hope* found her guns almost useless because of the ship's roll.

The German China fleet, the cruisers *Scharnhorst, Gneisenau* and the *Nürnberg,* had rejoined the cruisers *Leipzig* and *Bremen,* the latter vessels having been detailed to patrol the coast north of Valparaiso. The unit proceeded southward apparently well aware of the rendezvous of the British off Concepcion Bay.

At the same time the British cruisers *Monmouth* and *Glasgow,* accompanied by the transport *Otranto,* moved north to meet the flagship *Good Hope.* The British evidently were not aware of the proximity of the Germans and they met off Coronel.

It was 6 o'clock Sunday night when the Germans sighted the three British ships. The British attempted to alter their course evidently with an intention to approach the coast and gain territorial waters and so avoid an unequal match. The Germans, however, headed them off and forced the battle.

At the moment that the German guns were trained the *Good Hope* was seen coming at full speed, and through good seamanship she managed to join the other British ships.

The Britishers had come about and the two squadrons sailed southward in parallel lines, the Germans being nearer the coast. Gradually the two lines came nearer to each other and the *Scharnhorst* and *Gneisenau* simultaneously let go their twelve 8-inch guns, which they concentrated on the *Good Hope.* The firing continued for several minutes without damage. The German shots fell short and the *Good Hope* had such a roll that she could not reply. The smaller cruisers were far out of range.

Slowly the sea fighters drew in nearer and when the two squadrons were only 6000 yards apart, the *Good Hope* fired her two 9-inch guns. She was still unable to use her eight 6-inch guns, which on the gundeck were so near the water-line that as the vessel rolled they were almost awash. A terrible broadside from the *Scharnhorst* and *Gneisenau* crippled the British flagship and her engines stopped. The *Monmouth*, recognizing the distress of her companion, made a dash to cover the *Good Hope*, but by that time the distance separating the two squadrons had been reduced to 5000 yards and the Germans were able to bring all their ships into action and to use all the guns of the five vessels. These were directed first against the *Monmouth*, *Glasgow*, and *Otranto*. The *Otranto*, badly damaged, escaped in the gathering darkness and soon afterward was followed by the *Glasgow*, which also had been put out of action, but continued apparently seaworthy.

The five German ships continued their attack on the *Monmouth* and *Good Hope* until in a few minutes the *Monmouth* sank. By this time only 4500 yards separated the fighters.

The *Good Hope*, badly damaged, hung on until an explosion occurred aboard her. She withdrew to the westward at 7.30 o'clock. As she disappeared flames were seen on board her. Whether her crew was able to stop the fire or if the explosion finally sank her is not known. The flames died down and she was not seen again.

The *Nürnberg* searched until daybreak for the wounded ship when the German officers concluded that she had been lost with all her crew. The only trace found of the British was in the wireless message, in which the *Glasgow* called unsuccessfully for the flagship.

It was impossible to save any of the crew of the *Monmouth*, as the Germans could not put over their small boats in the face of the gale and the *Monmouth* could not have lowered her boats.—*New York Times*, 11/6.

LONDON, November 6.

It is officially announced that the Admiralty now has received trustworthy information about the action on the Chilean coast.

During Sunday, the 1st of November, the *Good Hope*, *Monmouth* and *Glasgow* came up with the *Scharnhorst*, *Gneisenau*, *Leipzig* and *Dresden*. Both squadrons were steaming south in a strong wind and a considerable sea.

The German squadron declined action until sunset, when the light gave it an important advantage. The action lasted an hour.

Early in the action both the *Good Hope* and *Monmouth* took fire, but fought until nearly dark, when a serious explosion occurred on the *Good Hope* and she foundered.

The *Monmouth* hauled off at dark, making water badly, and appeared unable to steam away. She was accompanied by the *Glasgow*, which had meanwhile during the whole action fought the *Leipzig* and the *Dresden*. On the enemy again approaching the wounded *Monmouth*, the *Glasgow*, which was also under fire from one of the armored cruisers drew off.

The enemy then attacked the *Monmouth* again, but with what result is not known. The *Glasgow* is not extensively damaged and has very few casualties.

Neither the *Otranto* nor the *Canopus* was engaged.

Reports recived by the Foreign Office from Valparaiso state that a belligerent warship is ashore on the Chilean coast, and it is possible that this may prove to be the *Monmouth*. Energetic measures are being taken on this assumption to rescue the survivors.

The action apears to the Admiralty to have been most gallantly contested, but in the absence of the *Canopus* the enemy's preponderance in force was considerable.

This was the news given to the British public by the Admiralty this evening just as the people were beginning to think that the German accounts of the result of the battle in the Pacific had been exaggerated. The

only bit of satisfaction for the British was that their little Pacific fleet had itself chosen to give battle to a very much stronger squadron and had not been overwhelmed until the last possible shot had been fired at the enemy.

The British cruiser *Glasgow*, which was with the *Good Hope* and *Monmouth*, too, put up a fight against two German cruisers, and when her bigger sisters were put out of action managed to escape.

There is still a ray of hope that the *Monmouth*, which the Germans said was sunk, may be the warship reported as being ashore on the coast of Chile. So far as known, none of the *Good Hope's* crew survived.—*New York Times*, 11/7.

THE KARLSRUHE IN THE ATLANTIC.—The German cruiser *Karlsruhe* captured and sunk the British steamship *Van Dyck* 500 miles east of Para on the morning of October 26.

Despite the fact that 20 British and French warships are reported searching for the *Karlsruhe*, she has so far managed to elude her pursuers and since the beginning of the war has been a decided menace to British and French shipping to the West Indies and South America.

On October 24 a cable despatch to the *Herald* from Teneriffe gave the names of 13 vessels sunk by the *Karlsruhe*. The list included 12 British steamships and one Dutch. Most of the captures had been made off the coast of South America or in the mid-southern Atlantic. This would make a total of 17 British vessels captured and destroyed by the German cruiser since the beginning of the war.

When the war began the *Karlsruhe* was sighted off Sandy Hook by many inbound vessels. The result was that British shipping from this port was held up for many days fearing that the German cruiser would capture any steamships outward bound. With the appearance of two British cruisers the *Karlsruhe* disappeared for a week, finally appearing in the harbor of San Juan, Puerto Rico, where she took aboard enough coal to carry her to her nearest home port, as allowed under the laws of neutrality, and put to sea. This was on August 9, and since that date she has become the phantom ship of the South Atlantic.

Three weeks later the German was surprised by two British cruisers while coaling at sea from the steamship *Kronprinz Wilhelm*. Both she and the passenger steamship were able to escape because of superior speed, although it was reported at the time that the British cruiser *Bristol* had been injured by the *Karlsruhe* in a running fight.

The *Van Dyck*, the latest prize of the *Karlsruhe*, is her biggest capture. She was the property of the Lamport & Holt line and steamed between New York and Buenos Ayres. She was a vessel of 9800 tons and one of the largest in the South American service from American ports.

The *Karlsruhe* is a modern protected cruiser of the first class, commissioned in 1913. She has a displacement of 5000 tons and a speed of 27 knots. Four hundred and fifty-six feet over all, she carries a crew of 373 officers and men. Her main battery consists of 12 4.1-inch guns.—*N. Y. Herald*, 11/3.

PLANS USED TO ROUND UP GERMAN COMMERCE DESTROYERS.—The Admiralty on October 22 issued a statement outlining the steps that are being taken to round up the eight or nine German cruisers at large in the Atlantic, Pacific, and Indian oceans:

"Searching for these vessels and working in concert under various commanders-in-chief are upwards of 70 British, Austrian, Japanese, French, and Russian cruisers, not including auxiliary cruisers. Among these are a number of the fastest British cruisers.

"The vast expanse of seas and oceans and the many thousands of islands offer almost infinite choice of movement to the enemy's ships. In spite of every effort to cut off their coal supply, it has hitherto been maintained by one means or another.

"In the face of the increasing difficulty the discovery and destruction of these few enemy cruisers, therefore, is largely a matter of time, patience, and good luck. The public should have confidence that the commanders-in-chief and the experienced captains serving under them are doing all that is possible and taking the best steps to bring the enemy to action.

"Our commanders so far have been occupied in very serious and important convoy duty, but this work has somewhat lessened, and the number of searching cruisers is being continually augmented.

"Meanwhile merchant ships must observe the Admiralty instructions, which it is obviously impossible to specify, and take all the precautions which have been suggested. On routes where these instructions have been followed they have so far proved very effective. On the other hand, where they have been disregarded, captures have been made.

"The same vastness of the sea which has so far enabled the German cruisers to avoid capture will protect trade.

"The only alternative to the methods now adopted would be the marshaling of merchantmen in regular convoys at stated intervals. So far it has not been thought necessary to hamper trade by enforcing such a system.

"The percentage of loss is much less than was reckoned on before the war. Out of 4000 British ships engaged in the foreign trade, only 39 have been sunk by the enemy, or less than 1 per cent in all. Seven vessels are now overdue in Atlantic waters.

"The rate of insurance for cargoes which at the outbreak of the war was fixed at 5 guineas per cent has now been reduced to 2 guineas per cent.

"Between 8000 and 9000 foreign voyages have been undertaken to and from United Kingdom ports, less than five per thousand of which have been interfered with, and of these losses a large number have been caused by merchant vessels taking everything for granted and proceeding without precautions, as if there were no war.

"On the other hand, German oversea trade has practically ceased to exist. Nearly all their fast ships which could have been used as auxiliary cruisers were promptly penned into neutral harbors or have taken refuge in their own. Among the comparatively few German ships which have put to sea 133 have been captured, or nearly four times the number of those lost by the very large British mecantile marine.

"In these circumstances there is no occasion for anxiety and no excuse for complaint. On the contrary, the more fully the facts concerning our oversea trade and its protection by the Royal Navy can be disclosed, and the more attentively they are studied, the greater will be the confidence and satisfaction with which the situation can be viewed."—*N. Y. Times*, 10/23.

COAL STRATEGY.—If in time of war it is impossible to catch a cruiser which is destroying commerce, her career may be effectively ended by tracking down and capturing her colliers, which are in all cases of comparatively slow speed. This is presumably the policy which will now be pursued in dealing with the German cruisers which are at large in the Atlantic and in the Pacific. It was hardly realized, perhaps, how careful the naval authorities in Berlin were in selecting the types of ships to be put on foreign stations. Ten years ago the principle held by many persons was that anything which could float would do for showing the British flag in foreign waters. One has only to glance at a navy list of the early years of this century to see what a curious assortment of old ships were being employed in distant seas. They were not only vessels with poor gun-power, but they were sadly deficient in speed. Nevertheless, when they were recalled, because they could neither fight nor run away, there was no little outcry. The experience of war has already shown that a cruising ship which does not possess high speed is deficient in the one quality which can make her useful during hostilities. The Germans realized this, and hence the six cruisers which are now causing so much commotion are all of them vessels with modern armament, high speed, and good endurance.—*Naval and Military Record*, 9/30.

MISCELLANEOUS

MEMORANDUM BY THE DIRECTOR OF THE AIR DEPARTMENT, ADMIRALTY

Commander Charles R. Samson, R. N., was in command of the Aeroplane and Armored Motor Support of the Royal Naval Air Service (Naval Wing) at Dunkerque between the dates September 1 to October 5.

During this period several notable air reconnaissances were made, and skirmishes took place. Of these particular mention may be made of the aeroplane attack on September 4 on four enemy's cars and 40 men, on which occasion several bombs were dropped; and of the successful skirmishes at Cassel on September 4, Savy on September 12, Aniche on September 22, Orchies on September 23.

On September 22 Flight Lieutenant C. H. Collet, of the Royal Naval Air Service (Naval Wing of the Royal Flying Corps), flying a Sopwith tractor biplane, made a long flight and a successful attack on the German Zeppelin airship shed at Dusseldorf.

Lieutenant Collet's feat is notable—gliding down from 6000 feet, the last 1500 feet in mist, he finally came in sight of the airship shed at a height of 400 feet, only a quarter of a mile away from it.

Flight Lieutenant Marix, acting under the orders of Squadron Commander Spenser Grey, carried out a successful attack on the Dusseldorf airship shed during the afternoon of October 8. From a height of 600 feet he dropped two bombs on the shed, and flames 500 feet high were seen within 30 seconds. The roof of the shed was also observed to collapse.

Lieutenant Marix's machine was under heavy fire from rifles and mitrailleuse, and was five times hit whilst making the attack.

Squadron Commander Spenser Grey, whilst in charge of a flight of naval aeroplanes at Antwerp, penetrated during a three and three-quarter hours' flight, into the enemy's country as far as Cologne on October 8. He circled the city under fire at 600 feet, and discharged his bombs on the military railway station. Considerable damage was done.—*United Service Gazette*, 10/29.

THE TURNING POINT OF THE WAR

GERMAN THEORY OF THE EASTERN CAMPAIGN AGAINST RUSSIA AND HOPE FOR THE RESULTS IT MAY BRING

By Walter E. Ives

Former Lieutenant in the Thirteenth Royal Prussian Dragoons

(The following article from the *New York Times* of November 22 appears to give a concise summary of the military aspect of the war from the German point of view. The account of the recent German advance upon Warsaw, the reasons advanced therefor and the new German campaign outlined in this article are extremely interesting.)

The campaign in France has come to an absolute deadlock. The task of breaking through the Franco-British line of powerful field fortifications, stretching from the Vosges to the Channel, and held by forces outnumbering the aggressors in the proportion of five to three, has proved superhuman, and for the time being a defensive campaign in Belgium and France has undoubtedly been decided upon. The Germans are fortifying their positions in Flanders, thus closing the gap in their own continuous line of field fortifications; they are bringing up all their siege guns of the heaviest caliber, and they have withdrawn all their cavalry from the western seat of war. These facts point to the beginning of a regular siege campaign along the entire line. For some time to come we will read of small advantages gained at one point and lost at another, but on the whole, the valor of the German troops, though greatly outnumbered by the enemy, can be counted upon to hold all the territory gained until the decision in the eastern seat of war will dictate the future operations.

Strange as it may seem to the German General Staff to see events progressing in a way entirely contrary to their expectations, and disappointing as it may be to the greater part of the Anglo-French sympathizers, there can be no further doubt that the fate of the entire campaign will be decided in Poland.

Germany's fate hinges on the success of General von Hindenburg's brilliant strategy. From the German viewpoint, therefore, the most important event of the war since the capture of Antwerp is the defeat of the Russians at Wlozlawsk. The battle there, if the advantages gained by it can be followed up successfully, will prove the turning point of the campaign against Russia, and therefore most probably of the war. This prediction may seem rather positive to the layman, but unbiased military men will agree with me. To illustrate my argument it will be necessary to review the latest operations in Poland, and the brilliancy of General von Hindenburg's strategy.

In view of the fact that the object of the German advance on Warsaw has been entirely misunderstood, the various amusing reasons, given for the retreat from there are not surprising, because both movements were working hand in glove. Among the more reasonable arguments given for the advance through the center of Poland were these:

Relief of the Austrian Army in Galicia.

Protection of East Prussia from a renewed invasion.

Starting of a revolution in Poland, to win over the Poles to the German cause.

The establishing of winter quarters in the enemy's country.

Purpose of German Invasion.—The actual purpose, though, was simply to strike at the right flank of the Russian armies, advancing through Galicia, and over Kielce in Southern Poland, drive them in a southerly direction toward the Carpathian Mountains, thus exposing them to attacks from the front and the rear and to cut off their communication from the northeast.

To accomplish this the main German Army advanced over Lodz and Radom. Incidentally a smaller army turned northeast from Lodz toward Warsaw to operate against the Russian Army of the center, which advanced from Lowicz. The object of this German Army was to engage the enemy and keep him busy until the operations in the southeast, against the main Russian Army, had come to a successful conclusion.

The very fact that the advance of the Germans on Radom did "relieve" the Austrian Army in Galicia, frustrated the strategy of General von Hindenberg. Instead of pursuing the Austrians purposely retreating more rapidly than necessary, and pressing on toward Cracow, the Russian Staff, correctly sizing up the seriousness of the situation, rapidly withdrew from the greater part of Galicia toward the northeast, and concentrated its main force in a line extending from Ljaskarshew, Ivangorod, and Lublin to Lemberg. At the same time the Russian Center Army withdrew from Lowicz to Warsaw. By the time the German armies reached the Vistula line in Poland they were confronted by one solid line of numerically superior Russian troops in splendid positions beyond the river.

As it never was the intention of the German Staff to carry a campaign into the deserts of Russia, particularly not in the face of the approaching winter, the enormous sacrifices of forcing the Vistula line between Warsaw and Tarlow were not warranted. It would have been possible to throw up field fortifications and hold the line once gained, but that at best would have ended in a deadlock, and a deadlock in both seats of war would have proved highly disadvantageous to Germany's interests in the long run.

Open battles in which concentrations of superior forces resulting from quick and skilful strategic movements would promise success were the only hope of the German Staff. A quick retreat from the Vistula carefully planned and not forced by battle was, therefore, resorted to, and in many respects this movement can be compared to the retreat from the Marne. The strategic object of the advance having been frustrated by the rapid retreat of the enemy, in both cases a radical change of strategy became

necessary. In both cases the retreat of the German armies is marvelous in its accomplishment; in France, on account of the desperate position of the German right flank, in Poland in appreciation of the topographic conditions of the country in general and the terrible state of roads and lines of communications in particular. It seems almost incredible how the pursuing Russians, with their vast superiority in numbers should not have been able to strike a death-blow at the retreating Germans before the latter could reach their prepared lines of defence. It will not be untimely here to call attention to the fact that so far in this war defensive movements have proved by far more successful than offensive operations.

Cracow Russia's Objective.—In an article on September 1 in *The New York Times,* I pointed out that Cracow must under all conditions be the main object of the Russian Army, and the same article set forth just where the strategic importance of this fortress lies. The developments during September and the early part of October have shown that my prediction of a concentration of the main Russian force against that city was correct, and the resumption of the Russian forward movement toward the southwest, after the German retreat from the Vistula, proved that the objective point of the Russian strategy had not been changed. This Russian strategy was well known to General von Hindenburg. He understood how to give his retreat the appearance of a desperate attempt to save the situation at the critical point. What was supposed to be his main army he withdrew in a general southwesterly direction toward Cracow. The Russians followed. At the same time they engaged the Austrians on the San River, "detaining" their retreat on Tarnow, and threatening to cut it off entirely. The Russian plan seemed to come to a successful conclusion. I will admit that at the time it looked bad for the German cause. It was not apparent why the Austrian troops on the San line and in Middle Galicia were not taken back at once to join the right flank of the Austro-German army before Cracow. Another thing that appeared strange was the seeming unwillingness of the German Army in East Prussia to yield ground to the Russians. In the same article of September 1, referred to above, I showed that the campaign in East Prussia was of secondary importance only, and that the German troops could well afford to withdraw to the impregnable Vistula line from Danzig to Thorn, temporarily, even sacrificing Königsberg, without imperiling the campaign against Russia of the Austrian and Austro-German armies in the south and the center.

What was the idea of the German troops in East Prussia in unnecessarily endangering their right flank, and thus their line of retreat, and what was the object of the Austrians in similarly exposing their left flank in Galicia and facing a like disaster, once the main army in Poland had retreated behind the Warthe River and on Cracow?

And then came the answer. The main army had gone back on Cracow and beyond the Warthe, but the moment it had reached this line of defence it had ceased to be the main army. With only enough troops left to defend this position, army corps after army corps boarded hundreds of trains and automobiles waiting on the direct and first-class roads along the Silesian border and were hurried north to the Posen-Thorn line. Here they were joined by at least five army corps which had been concentrated south of Thorn, coming partly from Belgium and partly from the interior of the German Empire, consisting mostly of newly trained men. In addition the entire cavalry which had been withdrawn from the west, about five cavalry divisions, joined this new army, known as the "Army of Thorn." The formidable troops which were gathered here were fully as strong, if not stronger, than the army that had previously moved on Warsaw.

On about November 5 it started its advance toward the east. On the 12th it reached Wlozlawsk, and there clashed with the Russian Army of the Center. The latter army is the same that retreated from Lowicz to Warsaw at the first approach of the Germans. It is an independent army that does not directly participate in the operations of the Russian main forces march-

ing on Cracow. Its purpose was originally to protect the right flank of the Russian main army against the advancing Germans, but then when the German Army appeared to be hastening back toward Cracow in a condition that seemed to make an extensive protection of the Russian right flank superfluous, this Army of the Center advanced independently in a northwesterly direction, in order to threaten the Vistula line in Germany, and thus to cut off the German armies in East Prussia.

Meaning of German Victory.—On the 16th the battle of Wlozlawsk ended in a complete victory of the German Army, the defeated Russian troops being thrown back about 30 miles to a line extending approximately from Kutno to Plock. This victory in itself, though, cannot be regarded as decisive. If the Germans are able to engage the retreating enemy east of Kutno, and here beat him once more before he can make an orderly retreat over the Vistula north of Warsaw (which is now undoubtedly the aim of the German Army advancing from Wlozlawsk), then this second victory is most likely to cause the breakdown of the entire Russian campaign for months to come.

On the other hand, if the Russians can bring up sufficient reinforcements to drive back the advancing Germans, or if they can merely check them, the value of the victory of Wlozlawsk will become nil. Its importance lies, therefore, only in the fact that the unforeseen movement from Thorn has taken the Russians by surprise and thus offers new possibilities to the German campaign.

General von Hindenburg's new strategy is really nothing but a repetition of his original scheme, only that it is undertaken from a base about 60 miles further north. It again consists of attacking the right flank of the main Russian Army, driving it south toward the Carpathian Mountains and into the arms of the Austrians, and cutting it off from the northeast, its base of supplies. This is the explanation of why the projected Austrian right wing in Galicia has not been taken back as far as had appeared advisable.

A victory over the Russian Army of the Center east of Kutno will enable the successful execution of the German plan. The Russian main army has advanced so far toward the southwest that this time it will be practically impossible for it to extricate itself from its perilous position by the quick retreat that frustrated von Hindenburg's original plan in October. A German victory east of Kutno will bring the Germans to Warsaw before the Russian Army before Cracow can retreat even as far as Kielce. The seriousness of the Russian situation is evident. The resistance of the German troops on the East Prussian frontier is also explained by General von Hindenburg's new movement. The wedge of the army of Thorn that was to be driven into the Russian forces along the Vistula line from Thorn to Plock was an absolute guarantee for the protection of the right flank of the German Army operating in East Prussia and made unnecessary the sacrificing of German territory.

And so it is plain that the fate of the campaign in Poland solely hinges on the success of the operations of the German Army of Thorn.

The strategic aspect of the situation near Kutno where the decision must fall is decidedly unfavorable to the Russians. A defeat with the Vistula in their rear will be almost sure to be a complete rout. Those of the Czar's troops able to get beyond the river will have to face the extreme left wing of the German Army of Thorn which is advancing over Lipno on the right bank of the Vistula and is in close touch with the German Army operating from East Prussia toward Mlawa.

Since the victory of Wlozlawsk the German operations toward the line Mlawa-Plock-Kutno have been pressed with all the vigor of which the German Staff is capable. No siege campaign is to be expected; the Russians won't get time to resort to it. In the near future the decision northeast and east of Kutno must come. A German victory will roll up the entire main Russian Army and result in the complete breakdown of the Russian campaign. The influence this will have on the campaign in France is apt to be

decisive as well. In short, the hope of Germany at this moment hangs on the success of the army of Thorn, and with conditions as they appear to be to-day the prospects seem bright.

But on the other hand it is only fair to say that if General von Hindenburg's brilliant plan of strategy again fails, if the Russians can take back parts of their main army northeast of Cracow and strengthen their army near Kutno before it can be defeated one of the last and surely the best trump cards will have been played by the German Staff without accomplishing the desired result. In this event it is also but fair to say that the offensive of the German armies in the east will share the fate of the German armies in France. To deny this is futile. It is my firm belief that a people from such stock as the German people never can be defeated, except by starving them out in a campaign of years, a campaign that in the end will mean the ruin of all the enemies as well, but whether the German people will be victorious is an entirely different question. To be victorious Germany must remain on the offensive. To do so she must break down the Russian campaign before the approach of winter. The success thereof as shown above hinges on the outcome of the decision near Kutno alone.

For the first time since this war started we are now in a position to say that the near future will tell whether Germany will be victorious or merely invincible.

NAVAL PUBLICATIONS

BOOK REVIEWS

"The Gyroscope." By F. J. B. Cordeiro. New York: Spon & Chamberlain, 1913, vii + 104 pages.

The plan of this book is admirably conceived. The first 16 articles, constituting 63 pages of the book, are devoted to the theory of gyroscopic action. This part of the work includes, in addition to the development of the fundamental principles, an explanation of gyroscopic action as a result of centrifugal forces, and a considerable amount of material which is primarily of astronomical interest and which may be passed over lightly by the reader whose interests are primarily in engineering. The remainder of the book is devoted to applications. It covers the theory of the Griffin Grinding Mill, Howell Torpedo, Obry Gear, Schlick Stabilisator, Brennan Monorail Car, Anscheutz-Kaempfe Gyro-Compass, and contains a discussion of Ballistics and of Astronomical and Geological applications. The author undertakes only to elucidate the dynamical principles involved in the applications, and does not concern himself with details of the mechanisms considered.

The dynamical theory of the gyroscope is, of course, very old; and any claim to novelty that a new article on the subject may have must relate to form and method of presentation. The author of the book under review expresses a purpose to present in small compass the material essential to an understanding of the principles of gyroscopic action, together with their applications, and to render the matter more intelligible to the reader with limited mathematical equipment. A new presentation of the subject, from this elementary point of view, should be a valuable addition to the literature.

It is unfortunate that the author, desiring to write clearly for elementary students, should have fallen into certain ambiguities and minor inaccuracies. On page 9, the sentence, "Let us suppose that in the infinitesimally small interval of time dt; in which we turn the axis OD through the infinitesimal angle $d\theta$, this axis will remain in the plane of the page, and that the component moments of momentum OE and OF will not have had time to change," is especially objectionable, as is also the next sentence, even though we are told in the next paragraph that the supposition cannot be strictly true, but approaches the truth as dt and $d\theta$ become smaller, and is strictly true at the limiting value of zero for these quantities. This review is not a proper place to discuss the concepts of limit, differential and increment, but it may be stated that in the work under discussion their treatment is not such as to produce clear ideas in the immature mind. An instance of ambiguity is found on page 13, where one must be prepared

to produce the developments independently if he would avoid misunderstanding the author.

Another unfortunate feature of the work is a disposition on the part of the author to quarrel with other writers on matters of terminology. An instance of this appears in the attack on the word "torque" as engineers "slang" for couple, at the same time that the author's definition of couple is itself questionable. A couple (page 5) is "two equal forces acting in opposite directions and at equal distances about some axis." This restriction of the axis to one equally distant from the two forces leaves us in doubt as to the proper terms to describe the effect of the forces about any other axis, such terms as torque, twisting moment, etc., being denied us. In common terminology, a couple consisting of two forces of one pound each at two inches apart, is not the same as one consisting of two forces of two pounds at one inch apart, but both have the same torque, about any axis perpendicular to the plane of the forces.

The reader of more mature experience is likely to find himself in a critical and unsympathetic attitude at the outset, due to implied criticisms of previous writers on the subject. And this attitude will not be improved by later uncharitable references to prevailing notions, nor by discovery of the imperfections the author has allowed to enter his own work. Were the direct and implied criticisms of accepted authorities and methods entirely deserved, yet in justice to his own work the author should have delayed his attack. Open minded appreciation is never fostered by an antagonistic spirit.

T. W. J.
R. E. R.

"The Naval Battle." By Lieutenant Baudry, French Navy. Translated by C. F. A.

Comprehensive up-to-date works on naval tactics are so rare that "The Naval Battle" should be received with universal interest by the naval profession.

The book merits attentive reading and study by all officers. It fulfills a long felt need by cleverly orienting, classifying, and analyzing the numerous phases and factors of sea battle, and by broadening the reader's understanding of their relative importance and interdependence.

In view of the periodically ascendant defensive school of French naval thought, the author constantly accentuates the prime importance of *meaning to fight,* even during peace preparation, and asserts that everything derived from the non-battle idea is parasitic.

The analyses of the "Memorandums" of both Nelson and Villeneuve are excellent, and so arranged as to greatly aid the student.

Among many eminently good tactical points emphasized, the following may be mentioned:

The chief function of tactics is to "make numbers" at the critical point and time. In sea engagements the importance of NUMBERS is very great. With similar units naval strength varies as the *square* of their number.

"At sea the balance tips up the moment it inclines"; that is, the initial advantage is of paramount importance. In view of the intensity of the effect of the torpedo it should come upon the stage at the crisis of the drama. The destroyer day attack in force should commence immediately after gun action begins. Destroyers should not seek engagement with their own class; their true objective is the enemy's capital ships. The primary role of the submarine should be that of a participant in the main fleet action.

In some respects the book is disappointing. The general conceptions of battle seem academic and needlessly vague. The accuracy and effect of modern long-range gun-fire are seemingly not fully comprehended. Apparently the author does not duly appreciate the capital importance of the TIME factor, which in sea fighting renders the role of personnel so vital, and subordinates matériel beneath the level assumed throughout the book. This time factor further necessitates that the fleet shall not be, as the author frequently implies, dependent upon the commander-in-chief's constant directions, but that it be trained like Nelson's fleet to simulate an automatic machine.

The closing observations on Unity of Doctrine by Captain Laur, French Army, are very interesting. Of particular merit is his suggestion that in the development of naval tactics we must very soon follow lines parallel to those found necessary ashore, and learn to combine and co-ordinate the effort of all types, in order to be able to produce the maximum act of force for use at the crucial time and place.

Since France has no probable "over seas" enemy her naval thought is necessarily colored a different shade from our own. Nevertheless, the numerous problems shared in common by the two navies make familiarity with the French view-point of great interest and value to us. All who have read Daveluy and Darrieus will appreciate how our own tactical development has been broadened by the influence of the modern French school. Baudry has given us another aid to tactical regeneration, by which we should not fail to profit. While we may differ with him in some particulars, his book is exceedingly original, interesting, and stimulating.

D. W. K.

"The Naval Constructor." By G. Simpson, M. I. N. A.

The naval constructor must be responsible for the ship as a complete design, and in this capacity he should be familiar with all that pertains to it. He should, therefore, have an interest in everything connected with the types of ships with which he has to deal, and it is most unfortunate that there is no one hand book in which all of the main elements, entering into the design as a whole, are treated. While the present author has covered many of the essential points, it is believed that he could have mentioned many others to advantage. He has studiously refrained from mentioning many strictly engineering details and even from bringing in so important a subject as that of propellers, although so intimately connected to the design of the hull. Again, there is no mention in the index of any subjects under the heading of "Electricity," when nowadays electricity plays so large a part in many of the important features of a ship. The subject

of construction details in connection with cold storage insulation, wireless insulation, and many kindred details, would be very welcome in such a hand book. The sins of the book, if any, are, thus, those of omission rather than commission; and although the author in his preface intimates that it would be possible to greatly enlarge the book, still he desires to have his book a *vade mecum* for those engaged in the design, construction and maintenance of ships, and, as such, it would seem as though more details could be added to advantage in future editions. In order to do this, and not make the book too cumbersome, it is suggested that it be printed on thinner paper, which has been adopted in the case of numerous other hand books.

The method of references might perhaps be placed in better sequence. For example, the formulas for laying out bevel and miter gear blanks are placed in the middle of the subject of anchor cranes (see page 405). The center of gravity by experiment should be allied with the center of buoyancy (page 11), and should be placed with the subjects under chapter I, instead of being more or less isolated (see page 249). The discussion of friction brakes for cranes should be placed immediately after cranes; and it is believed that the table of weights and properties of shapes would have been better at the end of the shipbuilding data, instead of between these data. It is to be hoped that the author will give us in his next revision a still more complete book that will fill a long felt want, not only as a book of reference but also as a book of instruction for the many aspiring draftsmen and naval architects who are unable to obtain all the class- and text-book instruction that they would like to have.

R. D. G.

"The War in Europe." By Albert Bushnell Hart. (Appleton.)

Professor Hart and his publishers have gotten out this book with amazing rapidity and efficiency; for the preface bears the date October 17, 1914—two and a half months after the war broke out—and the scope of the book covers a wide variety of considerations.

The book is divided into two parts: Conditions and War.

The first part begins with a short discussion of the "significance of the war," especially to Americans. Then follows an epitome of the history of the minor powers and of the great powers. Then comes an explanation of the "non-political divisions of Europe"; in which are considered in turn industrial unities, social unities, religious divisions, present lack of religious rivalry, and race divisions in each of the powers. Following this is an analysis of "international rivalries and strains" showing how the powers are opposed or aligned, as the case may be, on account of traditional national hatreds, race bitterness and military, commercial, transportation and colonial rivalries. Altogether in these one hundred and three pages the busy reader gets in a nutshell the controlling conditions which have shaped the destinies of Europe to the present day, and an "estimate of the situation" by which one is aided in one's judgment of the actions and re-actions which followed each other so swiftly and brought on the war.

The second part deals with the war as an accomplished fact and discusses the events that brought it on, and the attitude assumed by each of the powers. The chapter on the psychology of it all, dealing with the characters of the sovereigns, the ministers, the military men and public sentiment, is a most entertaining analysis. Questions of neutrality and methods of warfare are discussed in a manner that stamps the author as remarkably well informed both in international law and in the art of making modern war by sea and by land. The discussion of the outcome of the war and especially of possible terms of peace is of course speculation, but enlightened speculation, indulged in to the advantage, first of one side, then of the other side of the conflict. The chapter on the "effect of the war on the United States" is food for all thoughtful Americans. Says the author: "Modern military mobilization lays its hands upon the whole transportation system . . . . Think of our Civil War, when, from the firing on Sumter to the first attempt to move on Richmond, a whole year elapsed! Think of our leisurely movements in the Spanish War!" (It took six weeks to get 17,000 men into Cuba.) "Compare them with the colossal engine of mobilization which catches between its cogs the traveler and sojourner, whether native or foreigner!" And again: "Today the United States has for the time being lost a commerce to Germany and Russia which mounted up, out and in together, to five hundred and seventy-five millions dollars a year." And again: "The war cannot fail to change the point of view, both of military men and of statesmen, with regard to the nature and size of our military force. In comparison with the figures given in earlier chapters for foreign armies, our regular force is a bagatelle. . . . . our army is less than one-tenth of one per cent of the population; we had fewer soldiers ready for service in July, 1914, than Belgium with its seven million people." Again: ". . . . if European wars are to be as numerous in the future as they have been in the past, the United States will have to enlarge it rmy." Again: ". . . . there is much to be said for the Swiss system universal service for brief periods, counting together to about six months, and more for the officers. The Swiss are very like the Americans in their individuality and democracy and *neither of those qualities has been cut down by such service.* In spite of the undesirable side of barrack life, which is a severe test of a young man's morals, such a universal service would do much to set up American youth, to push back their shoulders, inflate their lungs, train their leg muscles, teach them to do what they are told, make them aware that every man-child in the world is born to perform service at the behest of older people. It will take the boys out of the slums and the schools and the farms and the shops for a few months, show them how large their own country is, give them the feeling that they are responsible for its welfare and defense. If the European war directs the United States toward that course, it will not have been altogether evil." Further: "Upon the navy the effect of the war must be much more immediate and startling." Again: ". . . . if Germany or England comes out of the struggle with a powerful and permanent navy there will be nothing for it, but that the United States should build ships enough to maintain its power and dignity. . . . . henceforth every power that makes

war will aim to strike with the intensity and suddenness with which Austria and Russia have struck. Politeness, consideration, willingness to listen to explanations are not a part of modern war and the United States must govern itself accordingly." Further: ". . . . we must learn the lesson that in war or in peace the great results are accomplished by those who think beforehand, make preparations, accumulate materials, develop commanders and submit to the guidance of experts in all technical matters." "The United States will be stronger when it looks the future squarely in the face and instructs its public men to justify democracy by showing that it knows how to take care of itself in the midst of the tremendous forces of our time." "The United States and all other powers must take notice that their neutrality in great world wars is dependent upon their ability to protect themselves. The rights of war are now defined not so much by international law, or by previous treaties, as by the extent to which a great and victorious power deems it desirable to push its physical powers, and wise nations will take precautions that these extreme principles of civilized warfare are not put into practice within their boundaries."

In all the book covers but two hundred and fifty-four pages, yet is encyclopedic in scope and leaves the reader satisfied that nothing important has been left out of consideration.

Professor Hart brings to his task a scholarship, broadened by travel, and universal acquaintance in most of the countries at war, and his deductions being singularly free from partisanship are, therefore, the more impressive.

W. W. P.

"Ocean Trade and Shipping." By Douglas Owen. Cambridge Naval and Military Series. (John Clay, at the University Press, Cambridge, England. 277 pages. Price $2.50 net.)

Together with the volume of *Naval and Military Essays*, this book inaugurates the Cambridge Naval and Military Series. To his summary of the process of ocean trade and shipping and of the methods of ocean traders in times of peace, the author has added some reflections on the situation arising on the sudden outbreak of war, and has reviewed the relations between neutral masters and belligerent naval officers at such a time. The book is illustrated by a number of photographs and facsimiles, and contains in the text, and in a folder attached to the back cover, replicas of various kinds of ships' papers.

When "Lloyd's is humming like a hive of bees disturbed"; when the *Emden* captures or destroys twenty-six merchantmen before she is hunted down; when Great Britain and her Allies are facing the gigantic problem of policing the lanes of the Seven Seas, we cannot fail to be interested in Mr. Owen's emphasis on the statement: "Naval officers . . . . are brought, in the exercise of their profession, into frequent contact with oversea trade. Not only does this occur in making arrangements for the supply of fleets and naval bases, but what is a more vital consideration, naval warfare has long been closely identified with the attack on and the defence of commerce. Much has been written and is constantly being written on this aspect of the subject; but while such writings usually assume on the part of naval

officers a practical acquaintance with trading methods, knowledge of this kind is almost of necessity beyond the scope or opportunities of most of them. None the less, the arduous and highly responsible duties involved by hostilities affecting ocean commerce require, almost as their foundation, just such knowledge. Not only do the system and methods of ocean trading in times of peace need a proper understanding, but inasmuch as the outbreak of war gives rise to new conditions and imposes on traders special obligations, these also should be understood."

Mr. Owen contends that the "laws of maritime capture are, in fact, largely founded on commercial conditions which have long ceased to exist," and that the prize court judgments of former days are obsolete. He proves conclusively that writers on international law have regarded the mercantile issue of the subject as a by-issue, that they have not even called attention to the radical changes which have grown out of altered conditions, and that the laws they lay down, not only will not, but cannot govern the traders of to-day.

It follows, then, that text-books on international law have ceased to be complete guides for the naval officer, who, in command of a belligerent ship, halts a neutral merchantman and examines her papers. What are the new principles by which he is to be guided? Mr. Owen attempts to explain these new principles, and apparently, so far as an evidently profound knowledge of facts and clear reasoning power can help him, he succeeds.

H. C. W.

"Why We are at War: Great Britain's Case." By members of the Oxford Faculty of Modern History. Third edition, revised. (Oxford University Press.)

It is practically impossible to keep one's personal opinions from coloring the review of such a book as this, for in the present quarrel what is gospel for one side is anathema for the other. But it can be said fairly that "Why We are at War" is the best presentation of England's case that has yet appeared, and its popularity is attested by the fact that it has already gone through three editions and six impressions. The authors, by the way, are giving all the proceeds from its sales to the Belgian Relief Fund.

The book has several virtues to commend it. It is attractively printed, it is brief—half the slender volume is devoted to the appendices—and it is written in a crisp, clear-cut style. It has the prime advantage of being written by men who, though presenting the case for one side, are historians rather than lawyers. They are experienced in handling historical evidence, they are specialists in modern European history, and they are scrupulous in presenting all the documentary evidence that applies. As evidence of their desire to deal fairly with the facts, they publish in the appendix the German White Book, exactly as it was issued by the Berlin authorities in their English translation. The fidelity to the original goes so far as to include, in its original form, that part of the German White Book which was not translated into English, facsimiles of the title pages, and—perhaps there is venom in this—even the mistakes in spelling and punctuation and

the fearfully involved sentences that appear in the Wilhelm-Strasse translation.

This impression of fairness is heightened by the calm and dignified style. Such restraint is most commendable in view of the intensity of feeling that prevails in England and the intemperate language to which this book is a reply. The Germans are not blamed for everything, and there is a sincere attempt to present the Berlin point of view. A passage where the Belgians are spoken of as being "left to the mercy of Huns less forgivable than those of Attila," is a very rare exception to the dispassionate tone that prevails throughout the book.

To Americans, who can get all the correspondence leading to the war by sending ten cents to the *New York Times*, the original material contained in the appendices will be less interesting than the brief historical sketches that comprise the book proper. These review the events and policies that led up to the great catastrophe of 1914. The chapter headings are as follows: I, The Neutrality of Belgium and Luxemburg; II, The Growth of Alliances and the Race of Armaments; III, The Development of Russian Policy; IV, Chronological Sketch of the Crisis of 1914; V, Negotiations and Negotiators; VI, The New German Theory of State. In these brief chapters the reader gets the benefit of the authors' historical equipment; the course of events is sketched in firm outlines without confusing detail. A point made in Chapter V which has not received proper emphasis on this side of the Atlantic is that Italian diplomacy labored in harmony with that of England, during the crisis of last July, to preserve peace and to turn Berlin and Vienna from their headstrong course. A point which might properly have been made in the chapter on the New German Theory of State is the fact that what Germans mean by their much-quoted word, "Kultur," is by no means what we mean by our word "culture," and that in the interpretation of the word "Kultur" may be found the essence of the German national ideal of today.

The case presented by "Why We are at War" seems convincing, at least to the type of mind not brought up on the maxims of Treitschke and Bernhardi. As the authors of the book intended, the documents speak for themselves. One difficulty remains, that is, as German sympathizers insist, these public documents may not be all that enters into the equation. Von Moltke used to say that he liked chess because it was a game in which "all the cards were on the table." Diplomacy is a game in which few of the cards are ever turned face up, and the historian of the future who summarizes the causes of the present war may have important evidence that does not appear now. But if England really is the "perfidious Albion" that Germans hate so bitterly, if, as they say, she conspired with Belgium for the invasion of the Fatherland and plotted the destruction of the German Empire, the burden of proof rests on those who make these indictments. And to be most convincing, the case must be presented with the dignity, restraint, and respect for evidence which characterize "Why We are at War."

W. O. S.

"La Marine de Guerre Allemande Avant Guillaume II." By Lieutenant Robert Cayrol. (Augustin Challamel, Rue Jacob, 17, Paris.)

A French naval officer has written a brief history of the German Navy from the middle of the last century to the accession of William the Second. The work is of far more than mere historical interest; for, as the author aptly states, despite the fact that so little is known of this period in the development of the German Navy, it is an epoch, which though not an exceptionally glorious one, is, none the less, well worthy of study. The principal interest of the book lies in its portrayal of the struggles of a few far-sighted statesmen to create for Germany a navy, in spite of the early apathy and final lukewarm support of Bismarck, in spite of the indifference of the middle classes, in spite of the parsimony of the Reichstag, and, above all, in spite of the blind reliance the German people placed in their army.

The author divides his subject into three periods:

I. The German Navy before the founding of the empire.

II. The German Navy from 1871 to 1883.

III. The German Navy from 1883 to the accession of William II.

In each of these epochs one man stood out preeminently as the champion of the navy. The first period had as its advocate Prince Adalbert of Prussia; the second, Albert von Stosch; and the third, Caprivi. Curiously enough, each of these men, guardians as they were of the interests of the navy, was an officer of the Prussian army. Each possessed traits that rendered him unqualified to make the ideal minister of marine, but each fought to the best of his ability to give Germany what the author terms a navy capable of living—"une marine viable"—a foundation upon which von Tirpitz was destined to build in such a creditable manner.

The German Navy was born of circumstances attending the war with Denmark over the province of Schleswig-Holstein, when the German people, who, in their blind confidence in their army had utterly neglected the navy, awoke to the humiliating realization that two small Danish vessels were effectively blockading the German coast. Then, of course, from every quarter there came a demand for a fleet. The parliament of Frankfort voted a modest appropriation, and the work was begun. At the outset, and for some years later, the vessels were built abroad, but finally the yards at Danzig and Wilhelmshaven developed with the fleet, and the construction was successfully undertaken in Germany. However, in spite of the early demand for a navy, the war with Denmark at an end, the German people lapsed into their former apathy so far as the navy was concerned, and as late as the Franco-Prussian War, the German Navy was incapable of facing the fleet of France. As the author states, the freedom of French commerce from molestation permitted France to equip her soldiers, to provision her army, and to prolong her defence. After the Franco-Prussian War, and the proclamation of the German Empire at Versailles, General von Stosch was made minister of marine, an office he held until 1883. His indomitable will and tireless energy resulted in wonderful improvements both in personnel and materiel; and, in 1883, he turned over to his successor, Caprivi, a well-organized navy and naval establishment. Caprivi, like Stosch, was

handicaped by Bismarck's opposition to the development of the navy. The chancellor relied implicitly in his army and had infinite confidence in his diplomacy; the navy was a secondary consideration. In the face of this opposition, Caprivi, who was not possessed of Stosch's indomitable will, reconciled himself to the situation. He endeavored to do the best he could with the materiel at hand. During his entire administration no capital ships were constructed. He did, however, succeed in constructing and commissioning a very efficient flotilla of torpedo boats, which, under the command of Prince Henry of Prussia, visited England and won the praise of the English people and press for the seamanlike qualities of their personnel. All in all, Caprivi's policy was one of defence; and he neglected the all-important principle that the very best defence lay in the organization of an efficient fleet of capital ships. Perhaps Caprivi's greatest achievement lay in his undertaking the construction of a canal from the North Sea to the Baltic. This great work, though long contemplated by German ministers, was not actually begun until the administration of Caprivi.

In conclusion, the author states that the growth of the German Navy in these, the early days of its existence, was a demonstration of the characteristic trait of the German people never to lose sight of the end to be attained. Sometimes they might deceive themselves in regard to the means, but with method and perseverance they kept the end in view and rapidly corrected any faults they might have committed as soon as they perceived them.

This is a very valuable work for those who wish to understand the foundation and base upon which the great von Tirpitz built the German Navy of to-day.

N. R. V. DER V.

"One Hundred Years of Conflict between the Nations of Europe: The Causes and Issues of the Great War." By Charles Morris. (The John C. Winston Co., Philadelphia, Pa. 464 pages. Price $1.50.)

The ingeniously displayed title and warlike illustration on the cover of this book may give an erroneous idea of its contents. What we actually have is about 300 pages of nineteenth century European history, to which have been added 64 pages of illustrations and about 80 pages on "The Great War," with the usual statistics, analyses of causes, and accounts of the warring nations. In the historical portions Mr. Morris writes fluently with emphasis chiefly on the military side of history, and a fondness for the superlative and startling in matters of style.

A. F. W.

MINUTES OF THE ANNUAL MEETING, 1914

U. S. NAVAL ACADEMY, ANNAPOLIS, MARYLAND,
October 10, 1914.

In pursuance of the following notice the annual meeting was held at 8.10 p. m. at the Officers' Mess:

U. S. NAVAL ACADEMY, ANNAPOLIS, MARYLAND,
September 30, 1914.

To Members of the United States Naval Institute:

The regular annual meeting of the United States Naval Institute and the election of officers will take place in the Board Room of the Officers' Mess at the United States Naval Academy on Friday, October 9, 1914, at 8 p. m.

B. C. ALLEN,
Lieutenant Commander, U. S. Navy,
Secretary and Treasurer.

Captain W. F. Fullam, U. S. Navy, Vice-President, presided, there being thirty-three members present.

The minutes of the last annual meeting were read and approved.

The first and stated business being the election of officers, the following tellers reported the vote, having been appointed by the Chairman one week previously:

Lieutenant Commander W. C. Asserson, U. S. Navy.
Lieutenant Benyaurd B. Wygant, U. S. Navy.
Lieutenant H. K. Hewitt, U. S. Navy.

The tellers reported the results of the election as follows:

For President:

Rear Admiral B. A. Fiske, U. S. Navy	290
Rear Admiral A. M. Knight, U. S. Navy	124
Rear Admiral F. F. Fletcher, U. S. Navy	1

For Secretary and Treasurer:

Lieutenant Commander B. C. Allen, U. S. Navy	288
Lieutenant Commander A. St. C. Smith, U. S. Navy	75
Lieutenant C. C. Gill, U. S. Navy	51
Lieutenant Commander Roger Williams, U. S. Navy	1

For Board of Control:

Naval Constructor D. W. Taylor, U. S. Navy	293
Commander W. W. Phelps, U. S. Navy	229
Lieutenant Commander N. L. Jones, U. S. Navy	224
Commander J. T. Tompkins, U. S. Navy	203
Captain Ridley McLean, U. S. Navy	200
Commander J. R. P. Pringle, U. S. Navy	189
Captain L. H. Chandler, U. S. Navy	154
Commander J. F. Hines, U. S. Navy	104
Captain G. H. Burrage, U. S. Navy	103
Lieutenant Commander C. Shackford, U. S. Navy	96
Commander J. P. Morton, U. S. Navy	93
Commander H. B. Price, U. S. Navy	87
Lieutenant Commander A. P. Fairfield, U. S. Navy	85
Captain J. W. Wadleigh, U. S. M. C.	78
Naval Constructor W. G. DuBose, U. S. Navy	76
Lieutenant R. A. Theobald, U. S. Navy	65
Lieutenant W. F. Jacobs, U. S. Navy	64
Lieutenant Commander T. L. Johnson, U. S. Navy	60
Lieutenant C. C. Gill, U. S. Navy	4
Lieutenant A. St. C. Smith, U. S. Navy	3
Pay Inspector M. M. Ramsey, U. S. Navy	1
Captain H. S. Knapp, U. S. Navy	1
Captain J. Hood, U. S. Navy	1
Lieutenant J. O. Richardson, U. S. Navy	1
Lieutenant S. Gannon, U. S. Navy	1
Col. C. H. Lauchheimer, U. S. M. C.	1
Captain W. F. Fullam, U. S. Navy	1

For Amendment, Art. X, Sec. 2	378
Against Amendment, Art. X, Sec. 2	5

There follow the present and proposed readings of Article X, Sec. 2, of the Constitution and By-Laws.

ARTICLE X

SEC. 2. Now reads: One copy of the PROCEEDINGS, when published, shall be furnished to each regular, life, honorary, and associate member, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

SEC. 2. Amend to read: One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The following officers were then announced elected:

President:
Rear Admiral Bradley A. Fiske, U. S. Navy.

Secretary and Treasurer:
Lieutenant Commander B. C. Allen, U. S. Navy.

Board of Control:
Naval Constructor D. W. Taylor, U. S. Navy.
Commander W. W. Phelps, U. S. Navy.
Lieutenant Commander N. L. Jones, U. S. Navy.
Commander J. T. Tompkins, U. S. Navy.
Captain Ridley McLean, U. S. Navy.
Commander J. R. P. Pringle, U. S. Navy.

The Secretary and Treasurer reported as follows:

To: The members of the United States Naval Institute.

Subject: Annual Report of the Secretary and Treasurer.

1. During the past year, beginning in January, the bi-monthly issue of the PROCEEDINGS was inaugurated.

Beginning as soon as the present stock of paper is exhausted—probably in the March-April issue—a somewhat different type of paper will be used in the PROCEEDINGS. It is more opaque, slightly stiffer and somewhat lighter.

2. The membership of the Institute is now 1591.

3. During the year 9 members have resigned, 18 died and 315 were admitted, making a net increase of 288 as compared with an increase of 200 last year. Officers of the service are showing a greater interest in the PROCEEDINGS, and an even greater increase in membership is hoped for next year. An attempt has been made to combat the seemingly prevalent opinion that the Institute is a wealthy close corporation run by a few officers at the Academy.

4. The Board of Control has obtained the following suggested prize essay topics:

"The Mutual Relations of Gunnery and Tactics."

"The Place of the Naval Officer in International Affairs."

"The Evolution of Naval Doctrine from National Character."

"The Training of Enlisted Personnel to Produce Modern Man-o'-war's-men: (a) Military Training; (b) Moral Training; (c) Education."

"The Organization, Employment and Training of Reserve Fleets and Flotillas."

"Value of Speed as an Offensive Element in Battleship Strategy and Tactics, as Compared with Armor."

5. The officers of the Institute have been changed as follows: On April 24, 1914, Lieutenant Commander B. C. Allen, U. S. N., was elected Secretary and Treasurer vice Lieutenant Commander E. J. King, detached. On July 7th Captain Geo. W. Logan, U. S. Navy, tendered his resignation as a member of the Board of Control. No successor was elected on account of the impending annual election of officers.

6. Attention is again invited to the fact that the cost of publishing the PROCEEDINGS (2500 copies per issue), including salaries, is $13,000 per year, whereas the income from investments, dues, subscriptions and advertisements is only $8,000. The deficit of $5,000 is made up by the sale of books.

7. The excess of receipts over expenses for the year is $2,187.83, which is about $150 more than the excess last year. When it is considered that the bi-monthly issue has materially increased the expenditures—the cost for 6 issues being about $1500 greater than that for the four quarters—and that several text-books (Reciprocating Engines, French and Spanish Phrase Books, Constitutional Law, Ballistic Tables and Practical Manual of the Compass) have been revised and the cost of revision and reprinting paid, while only a few of each have been sold as yet, it can be seen that the Institute is in excellent financial condition. These text-books are of course a sure asset, though the sales are slow.

8. In the past year the issue of the PROCEEDINGS has increased from 2,000 to 2,500; numbers 45 and 49 are exhausted.

RECEIPTS AND DISBURSEMENTS FOR THE YEAR ENDING SEPTEMBER 30, 1914

Receipts from October 1, 1913, to September 30, 1914		$34,273.23
Balance on hand September 30, 1913		13,918.92
		$48,192.15
Disbursements from October 1, 1913, to September 30, 1914		30,553.47
		$17,638.68
BILLS RECEIVABLE		
For Dues	$1,092.65	
For Extra Publications	2,032.76	
For Subscriptions	39.15	
For Advertisements	348.09	
For Interest	22.50	
		3,535.15
		$21,173.83

LIABILITIES

Lord Baltimore Press	$2,180.70	
Midshipmen's Storekeeper	1.20	
Meyer and Thalheimer	.52	
Western Union Telegraph Co.	.36	
Wells-Fargo Express Co.	5.05	
		2,187.83
		$18,986.00

MEMBERSHIP (CIRCULATION).

Regular members	1247
Life members	132
Associate members	207
Honorary members	5
Total membership	1591
Subscribers	478
	2069
Exchanges	86
Advertisers	45
Newspapers	45
Total circulation	2145

The following persons were then duly elected members of the Institute:

Captain H. G. Hamlet, U. S. Revenue Cutter Service.
Captain Ant. J. da Fonseca, Brazilian Navy.
First Lieutenant J. H. Pelot, U. S. Army.
Mr. Leo Loeb.
Captain E. A. Evers, Illinois Naval Reserve.
Third Lieutenant Edward H. Smith, U. S. Revenue Cutter Service.
Third Lieutenant T. A. Shanley, U. S. Revenue Cutter Service.
Ensign Edward G. Zimmer, New York Naval Militia.
Commander A. F. Nicklett, Ohio Naval Militia.
Commander P. I. Mulholand, Ohio Naval Militia.
Mr. E. R. Bouvier.
Mr. Sherman C. Lloyd.
Captain F. J. Haake, U. S. Revenue Cutter Service.
Mr. Frank J. Shipman.
Mr. J. R. Daniell.
Third Lieutenant H. N. Perham, U. S. Revenue Cutter Service.
Engineer-Lieutenant M. Shefik, I. O. Navy.
Lieutenant Leopolo Moreira, Brazilian Navy.
Mr. H. J. Hotten.
Mr. W. K. Post.

Mr. F. B. Howarth.
Mr. W. G. Williams.
Commander Armando Burlamaqui, Brazilian Navy.
Past Assistant Surgeon G. M. Rees, Michigan Naval Militia.
Commander G. T. Stephenson, Michigan Naval Militia.
Lieutenant H. W. Hecker, Michigan Naval Militia.
Lieutenant G. H. Cross, Michigan Naval Militia.
Captain D. M. Goodridge, Massachusetts Naval Militia.
Major F. E. Johnston, U. S. Army.
Lieutenant H. Vanderwerp, Michigan Naval Militia.
Surgeon J. M. Wilhelm, Michigan Naval Militia.
Lieutenant Commander Paul J. Ruppe, Michigan Naval Militia.
Mr. L. T. McKee.
Mr. Wm. M. Paul.
Mr. Park Benjamin.
Mr. Charles Briggs.
Mr. W. F. McGunnegle.
Mr. W. G. Mayer.
Mr. John Farnsworth.
Mr. J. P. Claybrook.
Commander J. F. Forshew, New York Naval Militia.
Mr. W. P. Mason.
Commander Ebenezer Hill, Connecticut Naval Militia.
Commander Russell Raynor, New York Naval Militia.
Mr. John W. McGrady.
Mr. Earle Farwell.
Second Lieutenant Antonio P. Cavalcanto, Brazilian Navy, U. S. S. *Arkansas.*
Mr. H. B. Goodwin.

There being no further business before the meeting, adjournment was had at 8.45 p. m.

B. C. ALLEN,
Lieutenant Commander, U. S. Navy,
Secretary and Treasurer.

NAVAL ACADEMY GRADUATES' ASSOCIATION

From the Farragut Window Committee comes the informal report that subscriptions are coming in with very satisfactory promptness. These have been principally from retired officers and civilians. Subscription lists are being circulated among officers on duty by commanding officers or others appointed by them; the speed with which results are obtained in these cases depends largely upon the interest shown by the individual engaged in this work.

The Secretary-Treasurer of the Committee writes:

Judging from such letters as have accompanied subscriptions, it would appear that only one phase of the project has appealed generally to the individual graduates. Many references have been made to Admiral Farragut. It is of course disgraceful and ungrateful for the service to have so long neglected to raise some memorial to the greatest man it has yet produced. It is also important that the Chapel should be embellished as soon as it can be appropriately done. But there are two other points that ought to make their appeal. In the first place this is the first great real reunion that the graduates of the Naval Academy have ever held. We cannot of course all get together in person, every one of us from Admiral Upshur to the youngest Ensign, but in this project we are getting together in spirit. At this reunion we are not merely assembling to hear a few speaches, to sing a few songs, and to eat a self-provided banquet; we are joining hands to accomplish a great and lasting work. We are going to put up a monument that generations are going to admire and from which innumerable classes of Midshipmen are going to receive inspiration. I say "admire" advisedly, for we are assured that the Farragut window is the finest thing of its kind that has ever been made in America. We all know the feeling of comradeship that exists among our graduates; we know the enthusiasm that takes possession of the Navy stand at a football game. In subscribing to this fund we are showing that the spirit is real.

Secondly; we are pledged to subscribe to this window; it is a debt of honor. The committee is acting under the orders of the Graduates themselves. You know how many sent you postcards voting for the project, more than a thousand, was it not? You know that the committee has taken no step on its own initiative; everything that has been done has been done by the body of Graduates themselves. To fail to subscribe is to repudiate the action of their own representatives. But why talk of "failing to subscribe"? No one is going to do that when they realize what this window means.

Appended is a list of Class 1914, arranged in order of graduation. All have entered the service with the exception of six, whose addresses are as follows:

4181 Mittendorf, H. C., St. John's College, Annapolis, Md.
4204 Palmer, E. C., 22 Yale Station, New Haven, Conn.
4231 Dortch, W. B., 644 Forest Ave., Gadsden, Ala.
4234 Bower, T. T., Mooresburg, Pa.
4280 Walker, A. W., Laurenceburg, Ky.
4285 Leonard, H. R. Jr., Bethlehem Steel Co., S. Bethlehem, Pa.

It is intended to give a list of changes—deaths, resignations, etc.—which have occurred in the last calendar year in the next issue. To bring the necrology up to January 1, 1914, the following list of those graduates whose deaths have been ascertained since the last edition of the Register is given. It will be noticed that some of the dates are prior to 1912, in which cases the facts have been ascertained since the publication of the 1912 edition.

171	Date	'41	Davidson, H.	Feb. 16, '13	Pirayu, Paraguay.
262	"	'49	Brown, G.	June 29, '13	Indianapolis, Ind.,
294	Class	'56	Dozier, W. G.	Nov. 9, '08	San Francisco, Cal.
303	"	'54	Barnes, J. S.	Nov. 23, '11	New York City.
366	"	'59	Hall, W. B.	Nov. 18, '12	Baltimore, Md.
377	"	'59	Smith, B. P.	Jan. 17, '86,	New York City.
408	"	'60	Casey, S.	Aug. 14, '13	Warm Springs, Va.
459	"	'61	Crall, G. A.	Nov. 8, '13	Veteran's Home, Napa Co., Cal.
479	"	'61	Johnson, M. L.	Feb. 14, '13	Portsmouth, N. H.
529	"	'63	Cooper, P. H.	Dec. 29, '12	Morristown, N. J.
624	"	'65	Fletcher, A. H.	Aug. 21, '12	Washington, D. C.
662	"	'66	Maynard, W.	Oct. 24, '13	Newton Center, Mass.
730	"	'66	Yates, I. I.	July 26, '12	Schenectady, N. Y.
745	"	'67	Easton, J. G.	Mar. 8, '13	West Norwell, Mass.
856	"	'68	Irvine, J. C.	Jan. 12, '13	Napa, Cal.
870	"	'68	Welch, C. P.	July 10, '12	Oakland, Cal.
904	"	'68	Trevor, F. N.	July —, '13	Buffalo, N. Y.
909	"	'68	Purdie, C. F.		Detroit, Mich.
919	"	'69	Perkins, C. P.	Oct. 5, '13,	Berkeley, Cal.
945	"	'69	Niles, K.	Dec. 6, '13	New York, N. Y.
948	"	'69	Patch, N. J. K.	Jan. 12, '13	Buffalo, N. Y.
949	"	'69	Rohrer, K.	May 29, '13	Washington, D. C.
972	"	'69	Houston, N. T.	Mar. 11, '13	New York, N. Y.
975	"	'69	Negley, W. C.	Mar. 8, '09	Butter, Pa.
1043	"	'70	Kilburn, W.	Sept. 4, '13	Bass Rock, Mass.
1080	"	'71	Qualtrough, E. F.	Nov. 18, '13	Washington, D. C.
1099	"	'71	Galloway, C. D.	Oct. 29, '12	Washington, D. C.
1114	"	'72	James, N. T.	May 25, '08	San Francisco, Cal.

1144	Class '73	Young, L.	Oct. 2, '12	New York, N. Y.
1159	" '73	Bean, J. W.	'92	
1226	" '75	Townley, R. H.	Dec. 9, '12	New York, N. Y.
1236	" '75	Stanfurth, F. S. C.	Feb. 15, '13	New York, N. Y.
1264	" '76	Jenkins, S.	Oct. 10, '13	Lakewood, N. J.
1267	" '76	Katz, E. M.	July 26, '09	Milwaukee, Wis.
1273	" '76	Varnum, W. L.	Mar. 25, '13	Washington, D. C.
1326	" '77	Hodges, B. W.	May 23, '13	Washington, D. C.
1378	" '78	Todd, W. L.		Carlisle, Pa.
1415	" '79	Sears, W. J.	Apr. 12, '13	New York, N. Y.
1489	" '80	Dickson, J. M.	'09	Dallas, Tex.
1508	" '80	Hill, C. H.	'10	Pensacola, Fla.
1562	" '81	Hunicke, F. H.	Sept. 10, '13	Colon, Panama.
1611	" '81	Enouye, Y.	Jan. 1, '13	Tokio, Japan.
1706	" '83	Barkley, R. W.	Dec. 29, '12	Washington, D. C.
1714	" '83	Chapin, F. L.	Dec. 19, '13	Naval Hospital, N. Y.
1739	" '83	Pettit, H. C.	July 26, '13	Wabash, Ind.
1774	" '84	McCreary, W.	May 5, '13	Buffalo, N. Y.
1825	" '85	Wright, B.		Brinkley, Ark.
1900	" '87	O'Halloran, T. M.		McKees' Rocks, Pa.
1925	" '88	Anderson, L. J.	Sept. , '04	Macon, Ga.
1961	" '89	Brand, C. A.	Oct. 17, '13	Colchester, Conn.
1971	" '90	Ruhm, T. F.	Dec. 3, '13	Seattle, Wash.
2077	" '92	Mather, G. H.	Nov. 9, '12	Bakersfield, Cal.
2108	" '93	Wilson, T. S.	Nov. 1, '13	Media, Pa.
2290	" '97	Pratt, P. L.	Mar. 31, '13	Juneau, Alaska.
2452	" '00	Wright, L. E. Jr.	July 1, '12	La Grangeville, N. Y.
2563	" '02	Hall, F. D.	Jan. 2, '13	Wilkinsburg, Pa.
2905	" '06	Morrison, D. P.	Oct. 1, '12	Newport, R. I.
2936	" '07	Hill, R.	May 8, '13	Annapolis, Md.
2992	" '07	Lawrence, W. W.	Aug. 19, '13	Boston, Mass.
3254	" '08	Botsford, O. St. A.	Aug. 28, '13	Shanghai, China.
3345	" '09	Ellington, E. L.	Nov. 24, '13	San Diego, Cal.
3428	" '09	Billingsley, W. D.	June 20, '13	Chesapeake Bay.
3774	" '11	Butler, A. H.	Oct. 13, '12	North River, N. Y.
3813	" '11	Ford, W. D.	Mar. 6, '13	Norfolk, Va.

MIDSHIPMEN, DATE 1910, GRADUATING CLASS OF 1914, 154 MEMBERS

No.	Name	State in which born	State from which appointed	No. in Grad. Ass'n.
4132	Ellsberg, Edward	Conn.	Col.	2336
4133	Cochrane, Edward L.	Cal.	Pa.	2337
4134	Davis, Noel	Utah	Utah	2338
4135	Ferrell, Robert W.	Va.	Va.	2339
4136	Bayley, Warner W.	Dist. of Col.	At large	2340
4137	Manning, George C.	Dist. of Col.	Pa.	
4138	Royce, Donald.	Mich.	Mich.	2341
4139	Pelton, Fred E.	Colo.	Colo.	2342

4140	Marron, Adrian R.	Colo.	Colo.	2343
4141	Jones, Carl. H.	Ala.	Ala.	2344
4142	Laycock, John N.	Mass.	Mass.	2345
4143	Fry, Conrad D.	Mich.	Ill.	2346
4144	Carey, Charles B. C.	Mass.	Md.	2347
4145	Nelson, Gordan W.	England	N. Y.	
4146	Samson, Henry P.	N. Y.	N. Y.	
4147	McGuigan, Joseph L.	Wis.	Okla.	2348
4148	Bryant, Carleton F.	Me.	Me.	
4149	Larson, William J.	Mich.	Mich.	2349
4150	Earle, Fred M.	Minn.	Vt.	
4151	Winslow, John S.	Ky.	Ohio	2350
4152	Tawresey, Alfred P. H.	Pa.	At large	
4153	Vinson, Thomas N.	Mo.	Cal.	2351
4154	Buchanan, John H.	Tex.	Tex.	2352
4155	Spanagel, Herman A.	Ohio	Ohio	2353
4156	Redman, Joseph R.	Cal.	Nev.	
4157	Lowe, Frank L.	Ark.	Ark.	2354
4158	Percival, Franklin G.	Iowa	Iowa	2355
4159	Westfall, Theo. D.	Ohio	Ill.	2356
4160	Gilchrist, K. P.	Mo.	Mo.	
4161	Ruddock, Theodore D., Jr.	S. C.	S. C.	2357
4162	Wicks, Zeno W.	N. Y.	N. Y.	2358
4163	Addoms, Andrew H.	Mo.	Mo.	2359
4164	Berry, Albert G., Jr.	France	N. Y.	2360
4165	Black, James D.	Ohio	Ohio	
4166	Wilson, George B.	Va.	Va.	2361
4167	Porter, William H., Jr.	Ky.	Ky.	2362
4168	Harrill, William K.	Tenn.	Tenn.	2363
4169	Quarles, Sherrod H.	Ala.	Ala.	
4170	Hale, John I.	Tenn.	Tenn.	
4171	Balsley, Alfred H.	N. C.	N. C.	2364
4172	Malloy, William E.	Tex.	Tex.	2365
4173	Dugger, Greene W., Jr.	Ala.	Ala.	2366
4174	Creighton, John M.	Kan.	Pa.	2367
4175	Swain, Charles D.	Mass.	Mass.	2368
4176	Burrough, Edmond W.	N. J.	N. Y.	2369
4177	Rooks, Albert H.	Wash.	Wash.	2370
4178	Neiley, George F.	Mass.	Mass.	2371
4179	Perry, Russell E.	Mass.	N. H.	2372
4180	Ralston, Byron B.	Ohio	Ohio	2373
4181	Mittendorf, Harvey C.	Ohio	Ohio	
4182	Wilson, Stanley L.	Mass.	Ariz.	2374
4183	Rey, Herbert J.	Wis.	Tenn.	2375
4184	Rosendahl, Charles E.	Ill.	Tex.	2376
4185	Moyer, John G.	Ill.	Ind.	2377
4186	Hayler, Robert W.	Ohio	Ind.	2378
4187	Clark, Bert F.	Wy.	Wy.	

4188	Sterling, Theodore F.	France	Mo.	
4189	Offley, Archibald N.	Dist. of Col.	At large	2379
4190	Conolly, Richard L.	Ill.	Ill.	2380
4191	Corn, William A.	Wy.	Utah	2381
4192	Nash, Thomas L.	Va.	Va.	2382
4193	Short, Edwin T.	Ore.	Ore.	2383
4194	Teasley, William A.	Ga.	Ga.	
4195	Waller, John B. W.	Va.	Va.	2384
4196	Wills, Arthur E.	Ind.	Ind.	2385
4197	Vaughan, Robert L.	Tex.	Tex.	
4198	Ingram, Homer L.	Ind.	Ind.	2386
4199	Doyle, Thomas J., Jr.	Neb.	Neb.	2387
4200	Earley, Alexander R. Jr.	Md.	Md.	2388
4201	Martin, Charles F.	Ga.	S. C.	
4202	Clarke, Vincent A., Jr.	Pa.	Pa.	2389
4203	Christian, Kemp C.	La.	La.	2390
4204	Palmer, Edward C.	Iowa	Iowa	2391
4205	Yeatman, Philip W.	Va.	Va.	2392
4206	McCown, James A.	Tex.	Tex.	2393
4207	Moore, Samuel G.	Tex.	Tex.	2394
4208	Hart, William J., Jr.	N. Y.	N. Y.	2396
4209	Vaiden, John L.	Ala.	Ala.	2397
4210	Riché, Swift	Mich.	Ill.	2395
4211	Marvell, George	Hawaii	At large	2398
4212	Page, Benjamin H.	Kans.	Kan.	2399
4213	Cunneen, Frank J.	N. Y.	N. Y.	2400
4214	Ashbrook, Allan W.	Ky.	Ky.	2401
4215	Deming, Raymond A.	Conn.	Conn.	2402
4216	Gladden, Charles T. S.	Tex.	Md.	2403
4217	Killmaster, Benjamin S.	Mich.	Mich.	2404
4218	Dyer, Robert A. 3d	N. Y.	N. Y.	2405
4219	Hatch, Raymond S.	Wis.	Wis.	
4220	Boak, James E.	Pa.	Pa.	2406
4221	Lahodny, William J.	Ohio	Minn.	
4222	Heard, William A.	Tex.	Tex.	2407
4223	Mecum, Charles H.	N. J.	N. J.	2408
4224	Howe, George T.	Ill.	Mich.	2409
4225	Hans, Rudolph F.	Ill.	Neb.	2410
4226	Stengel, Simson C.	Wis.	Wis.	2411
4227	Baker, Wilder D.	Kan.	Mich.	2412
4228	Moss, Julius M.	Miss.	Miss.	2413
4229	Dombrowski, Boleslaw L.	Ill.	Ill.	2414
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4231	Dortch, William B.	Ala.	Ala.	2416
4232	McDonald, Louis H.	Ohio	Ohio	2417
4233	Peck, Ervine D.	Wis.	Wis.	2418
4234	Bower, Thomas T.	Pa.	Pa.	2419
4235	Downey, Thomas T.	Mass.	Mass.	

4236	Jalbert, Horace H.	R. I.	R. I.	2420
4237	Arvin, George S.	Va.	Va.	2421
4238	Bumpus, Foster C.	Mass.	Mass.	2422
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4245	Griffin, Martin	Mass.	Mass.	2428
4246	Cohen, Marion Y.	Ala.	N. J.	2429
4247	Roehl, William F.	Wash.	Wash.	2430
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4249	Slingluff, Thomas C.	Md.	Md.	2431
4250	Washburn, Donald F.	N. Y.	N. Y.	2432
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4257	Shears, Karl R.	N. Y.	N. Y.	
4258	Wiltse, Lloyd J.	S. D.	S. D.	2438
4259	Alford, Leon O.	La.	La.	2439
4260	Fletcher, Paul W.	N. Y.	Vt.	
4261	Blades, Lawrence J. K.	Md.	Md.	2440
4262	Hoyt, Henry W.	Fla.	Fla.	
4263	Starkey, Robert C.	Ill.	Ill.	2441
4264	Austin, William D.	Ky.	Ky.	2442
4265	Arnold, Joseph C.	Pa.	Pa.	2443
4266	Weaver, Philip R.	R. I.	R. I.	2444
4267	McGowan, Charles A.	Me.	Me.	
4268	Luker, Robert P.	Ill.	Ill.	2445
4269	McReavy, Clarence J.	Wash.	Wash.	2446
4270	Kessing, Oliver O.	Ind.	Ind.	
4271	Moloney, John F.	N. Y.	N. Y.	2447
4272	Steece, Delorimier M.	Iowa	Minn.	2448
4273	Gearing, Wallis	Md.	Pa.	2449
4274	Beard, William K.	Fla.	Fla.	2450
4275	Fitzsimons, Paul, Jr.	R. I.	R. I.	2451
4276	Angel, Charles F.	N. Y.	N. Y.	2452
4277	Brown, John H.	Pa.	Pa.	2453
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4280	Walker, Augustus W.	Ky.	Idaho	2456
4281	Fox, William V.	Canada	Pa.	2457
4282	Stecher, Lewis J.	Neb.	Neb.	2461
4283	Worrell, Malcolm L.	Va.	Va.	
4284	Pennoyer, Ralph G.	Kan.	Mo.	2462
4285	Leonard, Henry R., Jr.	Pa.	Pa.	2463

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It now enters upon its forty-first year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary, and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control, and a vote equal to one-half the number of regular and life members, given by proxy or presence, shall be cast, a majority electing.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control, and, if their report be favorable, the Secretary and Treasurer shall make known the result at the next meeting of the Institute, and a vote shall then be taken, a majority of votes cast by members present electing."

Sec. 8. The annual dues for regular and associate members shall be two dollars, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be thirty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published every two months, and anyone may subscribe for them. The annual subscription is $3.00; single copies, 50 cents. Annual dues for members and associate members, $2.00. Fee for life membership, $30.00.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ESSAY, 1915

A prize of two hundred dollars, with a gold medal, and a life-membership in the Institute, is offered by the Naval Institute for the best essay presented on any subject pertaining to the naval profession.

On the opposite page are given suggested topics. Essays are not limited to these topics and no additional weight will be given an essay in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. The award for the prize will be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay in a sealed envelope to the Secretary and Treasurer on or before January 1, 1915. The name of the writer shall not be given in this envelope, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary and Treasurer, with the motto on the outside and writer's name and motto inside. This envelope is not to be opened until after the decision of the Board.

3. The successful essay to be published in the PROCEEDINGS of the Institute; and the essays of other competitors, receiving honorable mention, to be published also, at the discretion of the Board of Control; and no change shall be made in the text of any competitive essay, published in the PROCEEDINGS of the Institute, after it leaves the hands of the Board.

4. If, in the opinion of the Board of Control, the best essay presented is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention" or such other distinction as the Board may decide.

5. In case one or more essays receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

6. Any essay not having received honorable mention may be published also, at the discretion of the Board of Control, but only with the consent of the author.

7. The essay is limited to fifty (50) printed pages in the PROCEEDINGS of the Institute.

8. It is requested that all essays be submitted typewritten and in duplicate, if practicable; essays submitted written in longhand and in single copy will, however, receive equal consideration.

9. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

B. C. ALLEN,
Lieut. Commander, U. S. N., Secretary and Treasurer.

PRIZE ESSAY TOPICS

SUGGESTED AT THE INVITATION OF THE BOARD OF CONTROL

BY

THE PRESIDENT OF THE NAVAL INSTITUTE, THE SUPERINTENDENT OF THE NAVAL ACADEMY, THE PRESIDENT OF THE NAVAL WAR COLLEGE, AND THE COMMANDERS-IN-CHIEF OF THE ATLANTIC, PACIFIC AND ASIATIC FLEETS.

"The Mutual Relations of Gunnery and Tactics."

"The Place of the Naval Officer in International Affairs."

"The Evolution of Naval Doctrine from National Character."

"The Training of Enlisted Personnel to Produce Modern Man-o'-Warsmen: (a) Military Training; (b) Moral Training; (c) Education."

"The Organization, Employment and Training of Reserve Fleets and Flotillas."

"A Personnel Reserve for the Naval Service."

"Value of Speed as an Offensive Element in Battleship Strategy and Tactics, as Compared with Armor."

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NAVAL EDUCATION. First Honorable Mention. By Lieut.-Com. C. F. Goodrich, U. S. N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U. S. N.

1880

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U. S. N.

1881

The Type of (I) Armored Vessel, (II) Cruiser best suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U. S. N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U. S. N.

1882

Our Merchant Marine: The Causes of its Decline and the Means to be taken for its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. J. Kelley, U. S. N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U. S. N.

"SPERO MELIORA." Honorable Mention. By Lieut.-Com. F. E. Chadwick, U. S. N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U. S. N.

1883

How may the Sphere of Usefulness of Naval Officers be extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U. S. N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U. S. N.

"CULIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U. S. N.

1884

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U. S. N.

1885

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U. S. N.

1886

What Changes in Organization and Drill are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U. S. N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORTS FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U. S. N.

1887

The Naval Brigade: its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins.

1888

Torpedoes. Prize Essay, 1888. By Lieut.-Com. W. W. Reisinger, U. S. N.

1891

The Enlistment, Training and Organization of Crews for our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U. S. N.

DISPOSITION AND EMPLOYMENT OF THE FLEET: SHIP AND SQUADRON DRILL. Honorable Mention, 1891. By Lieutenant R. C. Smith, U. S. N.

1892

Torpedo-boats: their Organization and Conduct. Prize Essay, 1892. By Wm. Laird Clowes.

1894

The U.S.S. Vesuvius, with Special Reference to her Pneumatic Battery. Prize Essay, 1894. By Lieut.-Com. Seaton Schroeder, U. S. N.

NAVAL REFORM. Honorable Mention, 1894. By Passed Assistant Engineer F. M. Bennett, U. S. N.

1895

Tactical Problems in Naval Warfare. Prize Essay, 1895. By Lieut.-Com. Richard Wainwright, U. S. N.

A SUMMARY OF THE SITUATION AND OUTLOOK IN EUROPE. An Introduction to the Study of Coming War. Honorable Mention, 1895. By Richmond Pearson Hobson, Assistant Naval Constructor, U. S. N.

SUGGESTIONS FOR INCREASING THE EFFICIENCY OF OUR NEW SHIPS. Honorable Mention, 1895. By Naval Constructor Wm. J. Baxter, U. S. N.

THE BATTLE OF THE YALU. Honorable Mention, 1895. By Ensign Frank Marble, U. S. N.

1896

The Tactics of Ships in the Line of Battle. Prize Essay, 1896. By Lieutenant A. P. Niblack, U. S. N.

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NAVAL APPRENTICES, INDUCEMENTS, ENLISTING AND TRAINING. The Seaman Branch of the Navy. Honorable Mention, 1896. By Ensign Ryland D. Tisdale, U. S. N.

THE COMPOSITION OF THE FLEET. Honorable Mention, 1896. By Lieutenant John M. Ellicott, U. S. N.

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TORPEDOES IN EXERCISE AND BATTLE. Honorable Mention, 1897. By Lieutenant J. M. Ellicott, U. S. N.

1898

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OUR NAVAL POWER. Honorable Mention, 1898. By Lieut.-Com. Richard Wainwright, U. S. N.

TARGET PRACTICE AND THE TRAINING OF GUN CAPTAINS. Honorable Mention, 1898. By Ensign R. H. Jackson, U. S. N.

1900

Torpedo Craft: Types and Employment. Prize Essay, 1900. By Lieutenant R. H. Jackson, U. S. N.

THE AUTOMOBILE TORPEDO AND ITS USES. Honorable Mention, 1900. By Lieutenant L. H. Chandler, U. S. N.

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OUR TORPEDO-BOAT FLOTILLA. The Training Needed to Insure its Efficiency. Honorable Mention, 1903. By Lieutenant E. L. Beach, U. S. N.

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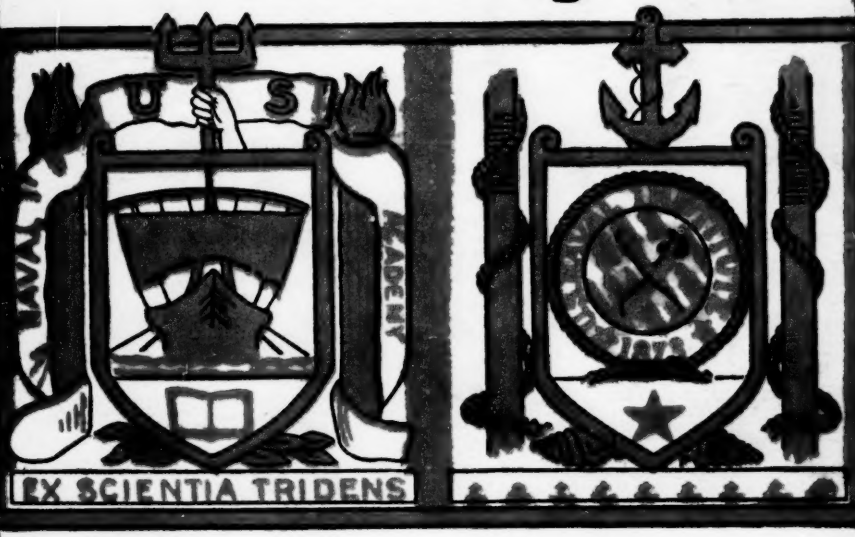

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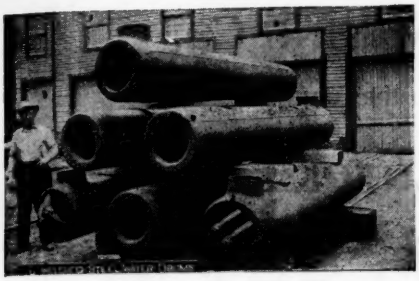

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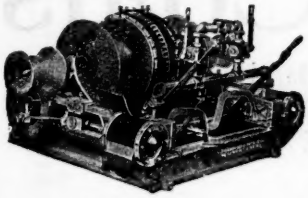

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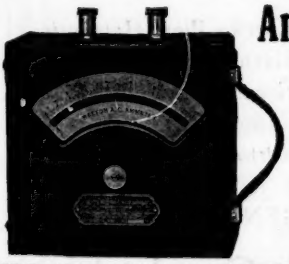

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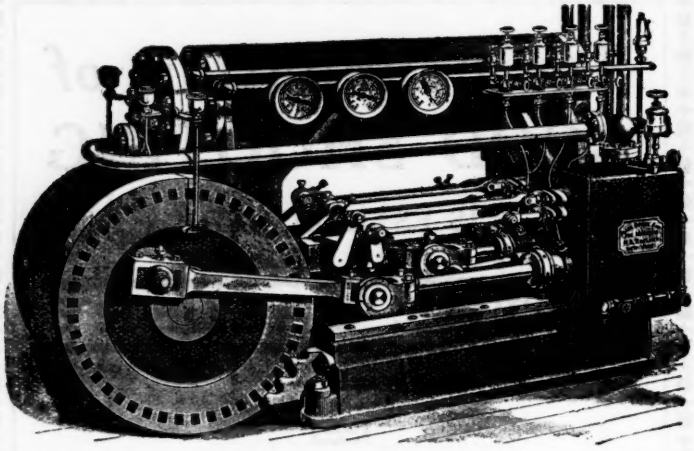

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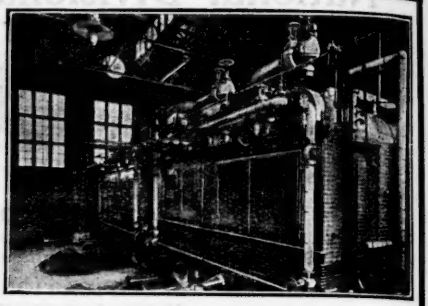

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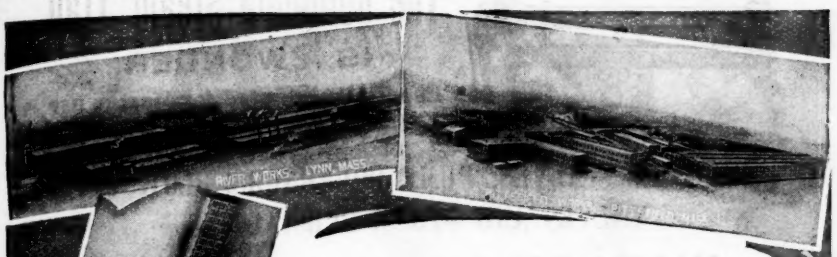

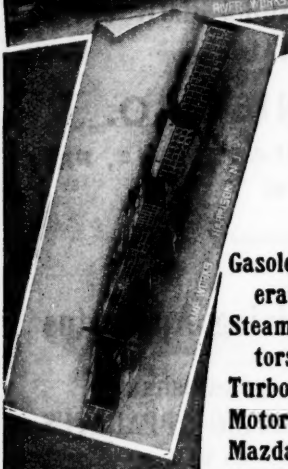

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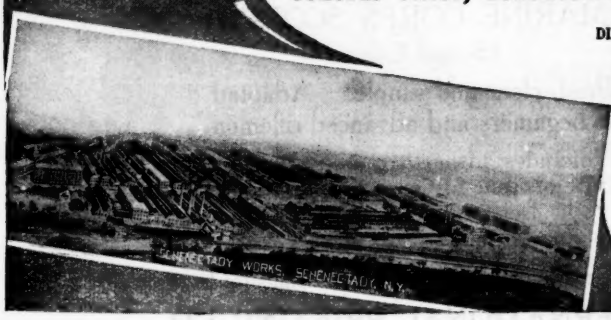

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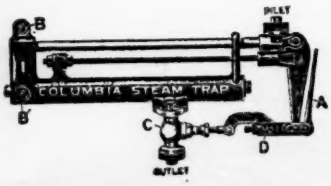

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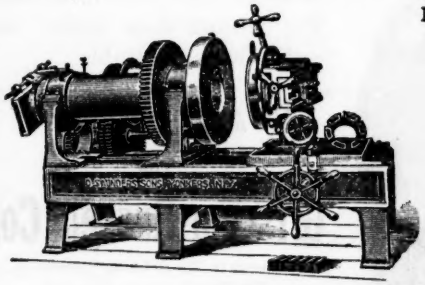

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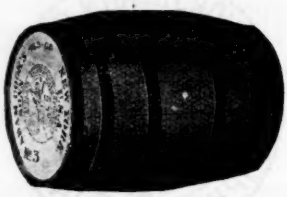

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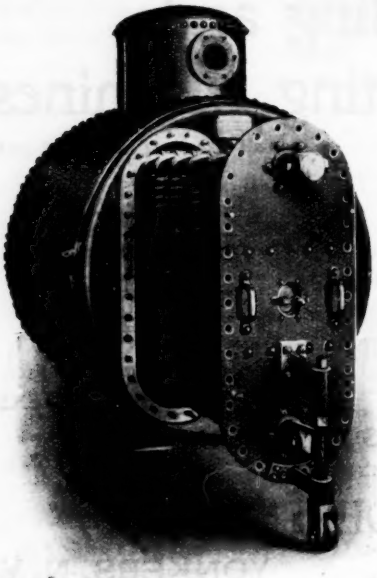

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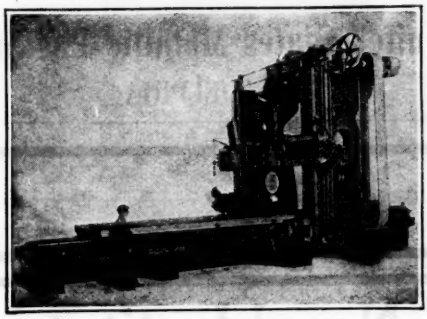

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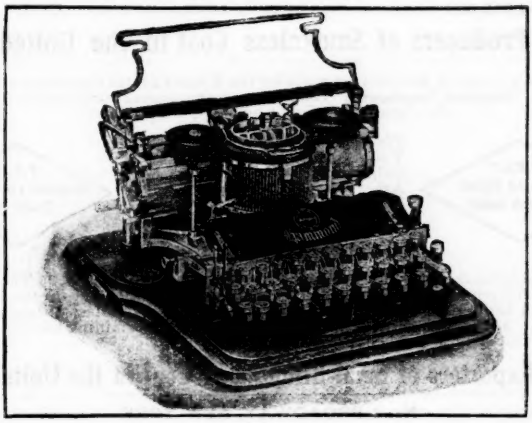

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